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JANUARY—JUNE, 1905.

THE CIRCUMSTANCES AND TREATMENT OF MOVABLE KIDNEY.

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CONSPICUOUS among the maladies of modern times is the curious condition known as movable kidney. The early pathologists were aware of the various congenital anomalies of position to which the kidney is liable, but the movable kidney appears to have escaped their notice.

It does indeed still escape notice on the post-mortem table, its undue mobility practically ceasing with the patient's life. At the autopsy the organ is found in place, and there may be nothing to suggest that it had ever left its normal position. Moreover, it is not always possible to determine after death if a kidney had been clinically movable during life, except perhaps in cases in which the mobility has been extreme.

Ebstein [1] mentions that in 3,658 autopsies performed in the Charité at Berlin a movable kidney was found in 5 instances only, showing the proportion of the affection to be apparently 1 in 732.

On the other hand, Glénard asserts that among females no less than 22 per cent. of all adults have movable kidneys.

The discrepancy between these two quite precise statements is not a little astonishing, and serves to illustrate the differing views in which the movable kidney presents itself to the notice of the maker of post-mortems on the one hand, and the clinical diagnostician on the other.

While the silence of earlier writers on morbid anatomy is intelligible, and the results of modern pathological records are to be explained, it is difficult to understand how the movable kidney came to elude so long the notice of the clinical observer.

[1] Ziemssen's *Cyclopædia of Medicine.* London. 1877.

The displaced or displaceable organ is as a rule singularly easy to detect, and indeed is apt to thrust itself incontinently into notice. It has been more than once discovered by the introspective patient, who has been much terrified by the apparition and by the diablerie of its movements.

Yet in spite of this it seems to have escaped the cunning and watchful fingers of the man of medicine until quite recent times.

It could hardly have been included with the phantom tumours of bygone days, for the accounts of the phantom, though always vague, leave little doubt but that it owed its being most usually to a contracted section of the rectus muscle or to a labouring intestine distended with gas or fæces.

It is strange that to Dr. Bright, the shrewd physician, there should not have appeared this common phenomenon, for he makes no mention of it in his very exhaustive and elaborate " Clinical Memoirs on Abdominal Tumours."

The majority of the cases upon which Bright based his memoirs fall between the years 1828 and 1839.

The first sound clinical description of movable kidney appears to have been given by Pierre Rayer, whose work (*Traité des Maladies des Reins*) was published in Paris in 1839.

It can scarcely be assumed that the movable kidney is to be ranked among the many inventions of the ever-active 19th century, or that it is one of the teeming products of the productive Victorian era.

The condition has been referred to by some modern writers as a stigma of degeneration, but such stigmata are not of abrupt appearance, and yet previous to the commencement of the last century no detailed mention of the movable kidney is, I believe, to be found.

Ebstein, who appears to have dipped into the history of the matter, states that " observations " on movable kidney were made by Mesua and Johannes Riolan, two writers who flourished in the 16th century, but he ascribes the real clinical appreciation of the condition to Pierre Rayer. Some account of the movable kidney as it is at present regarded may now be given.

The Anatomy of Movable Kidney.—The kidneys are deeply placed at the back of the abdominal cavity. If the body were transparent it would be seen that these organs are to a great

extent covered in front of the cartilages of the seventh, eighth, ninth, and tenth ribs, that the upper end of the left kidney reaches to the height of the ensiform cartilage, and the right nearly to that level. According to Quain the left kidney is 1½ inches, and the right 1 inch, above the position of the umbilicus, or the summit of the iliac crest. The organ on the left side is frequently altogether above the infracostal plane. The upper end of the kidney lies upon the diaphragm.

The organs are somewhat lower in women and in children than in the adult male. In childhood the kidneys are relatively larger than in the adult, and before the tenth year are surrounded by very little fat.

The kidneys lie in recesses on either side of the spinal column, and are invested by that extension of the subperitoneal tissue which is known as the perirenal fascia. The organs themselves are immediately surrounded by a considerable quantity of fat, in which, indeed, they are buried.

The kidneys are maintained in position by the fascia and fat which surround them, by the general pressure of the abdominal viscera—the important intra-abdominal pressure—and to a minor degree by the vessels which are proper to the organ. Much support is also derived from the configuration of the lumbar recesses in which they are lodged.

The peritoneum, which passes over the ventral surface of the kidney, has little effect in holding the gland in place. The serous membrane is itself readily rendered mobile, and it has but an indifferent hold upon the fascia and fat in which the kidney is lodged.

There are in this fascia certain strands of condensed tissue which pass from the structures forming the posterior abdominal wall to the fibrous capsule of the kidney. These appear to me to take a prominent part in the fixation of the organ. They vary in consistence, are often tough, and are then encountered by the finger in clearing the kidney from the surrounding tissues in the operation of nephrectomy. It may be said, however, that Wolkow and Delitzin are of opinion that these bands have little or no effect in supporting the organ.

The normal kidney moves on respiration. This is a point insisted upon by most writers. Those who are specially impressed by the mobility of the gland allude to the passage of

the kidney up and down when exposed through an incision in the loin. Kidneys so exposed are—it is to be hoped—seldom normal, and the posture of the patient during operation as well as the respiration under anæsthesia is also not normal. Dentu states that the range of the up-and-down movement of the normal kidney during natural breathing is from 3 to 5 cm.

This I cannot think is accurate. It many times falls to the lot of the surgeon to have to examine the kidneys during an abdominal operation, and many times the organs so palpated are normal. The occasion is not suited for the making of physiological observations, but the impression such examinations have left on my mind is this—that the movement of the left kidney on inspiration is often not to be appreciated, while that of the right is slight and always much less than is the respiratory movement of the liver. A range of movement of 3 to 5 cm. I have never witnessed in normal organs.

Etiology of Movable Kidney.—The etiology of movable kidney is obscure, and little is known of the precise tissue-changes which lead to the prolapse of the organ. This can be said, that it is infinitely more common in women than in men, that it is more frequently met with on the right side, and that most of the cases fall between the ages of 25 and 50, or are at least first discovered between those periods.

Glénard states that out of 148 cases which came under his notice, 131 were in females and 17 in males. In 126 instances the lesion was on the right side, in 3 only was it on the left, while in 19 examples both kidneys were movable.

Legry states that 87 per cent. of the cases are in women, and Dentu considers that from 85 to 90 per cent. of the instances are on the right side. One writer is so far impressed with the frequency of movable kidney in women as to assert that 22 per cent. of all adult females present this condition.

There is no doubt but that a movable kidney is quite uncommon among men. I have never been called upon to seriously treat this condition in a man, and while operations upon movable kidney are only too common, such records as I have encountered are almost silent as to operations upon men.

A displaceable kidney on the right side in a male subject is now and then met with, but such a condition on the left

side is, in my experience, exceedingly rare. The diagnosis of a left movable kidney in a man is not so uncommon, but the tumour has not always realised the diagnosis and has usually proved to be some such thing as a fæcal mass in the colon or a sarcoma of the omentum.

A large proportion of the women who are the subjects of movable kidney are individuals of feeble muscular development, of lax tissues, with flabby abdominal walls, and with possibly a tendency to general enteroptosis; on the other hand, a movable kidney is by no means to be discovered in all cases of pendulous abdomen.

The trouble is more common in those who have had many children than in those who are childless, and quite a striking proportion of the subjects have become more or less rapidly thin. There is no doubt but that the rapid loss of intra-abdominal fat is a common and immediate cause of loose kidney. Sometimes the diminution in weight has come without apparent reason, while in other instances it has followed upon some exhausting illness.

The mere loss of the perirenal fat will not, however, produce a movable kidney. This state of the organ is by no means of necessity a feature of emaciation. On the other hand, a movable kidney may be met with—although rarely—in the corpulent, and every surgeon will testify that the wandering organ when exposed by operation is not always found to be deprived of its fatty envelope. Now and then the invest-ment of fat has appeared to me to be normal, although there can be no doubt but that in the majority of the examples of movable kidney the amount of the perirenal fat is diminished.

There is evidence to support the view that undue mobility of the kidney may be produced by injury. Such a sequence of events is uncommon, but I have met with instances that I think are beyond question.

Long-continued horse exercise, and especially hunting, have been accredited with the production of movable kidney, but here it would seem probable that the jolting has drawn attention to the condition rather than produced it.

Examples of movable kidney have been met with in quite young women and even in children, and there is much proba-bility that certain cases are congenital. In this connection it

may be said that the meso-nephron would appear to be a pure myth. It has been described, and the description has been faithfully repeated. The structure does not, however, seem to have been seen by the human eye, and indeed the meso-nephron has for long occupied the position of an anatomical Mrs. Harris.

There is no evidence that tight-lacing plays any part in the production of the condition now under notice. Although the deformity effected by tight-lacing is no longer popular, yet writers still claim for the practice the merit of original sin, and ascribe to it many disorders which are of obscure etiology.

The Examination of a Movable Kidney.—A normal kidney cannot be discovered by palpation in the living subject. The only exception to this statement may be provided by the subjects of extreme emaciation and by thin children, especially when they are examined in the erect position.

In searching for a movable kidney the patient lies upon the back, the surgeon sits upon one side of the couch facing the patient. It may be assumed that the examination is being made upon the right side. In such case the surgeon's left hand supports the loin from behind, the fingers occupying the space between the last ribs and the iliac crest. The palm of the right hand is placed firmly upon the anterior abdominal wall just below the ribs. The fingers point upwards and outwards. Associated with these fingers of the right hand is the left thumb. The patient is made to take a deep inspiration, and the kidney, if movable, is felt to descend between the left fingers spread out behind and the left thumb and right hand on guard in front. A little pressure between the hands and the organ is held, while a little more pressure during expiration and it will slip away again under the ribs.

Glénard describes the steps of the examination under three graphic headings : the lying in wait, the capture, the escape.

This examination must be supplemented by an investigation of the renal area when the patient lies upon the sound side. In this attitude, if the shoulders be well raised and a deep inspiration be taken, the kidney may be felt to have tumbled towards the median line or to move on respiration between the two watching hands. An exceptionally movable kidney may be entirely overlooked if it happen to be absent from the renal

region when that district is being examined. I remember an instance in which one surgeon said that the kidney was the most movable he had ever encountered, while another surgeon maintained that the organ did not move at all.

A further examination of the district should also be made when the subject is standing erect.

The inferior border of the organ is well defined, but the upper extremity will be masked more or less completely.

Degrees of Movable Kidney.—Glénard bases four degrees of movable kidney upon the results of the method of examination just detailed :—

1st degree. The kidney just descends on inspiration. Its lower end can be felt, but not held.

2nd degree. The kidney can be held between the fingers, but its upper extremity is not to be defined.

3rd degree. The tissues above the upper end of the kidney can be compressed, and some definition of the upper end be made.

4th degree. The kidney is floating and can be felt during expiration by mere palpation. The " floating kidney " is unaffected by respiration. It is most often found in the region of the navel, or may extend well into the iliac fossa.

From the clinical observation of movable kidneys of different degree it would appear that the organ at first descends vertically, becoming more and more anterior as its attachments are the more loosened. The upper end inclines outwards and the lower end inclines in. Indeed, so marked is this rotation that the movable kidney of the 4th degree tends to become almost transverse in position.

It appears to me also that the thick outer border of the gland moves more and more towards the front wall of the abdomen until it becomes nearly anterior. This feature is noticeable when the organ is exposed by operation in the loin. Indeed, when the patient is lying upon the sound side so much may the kidney be rotated on its vertical axis that the operator in opening the lumbar region may come first upon the posterior surface of the organ.

The movable kidney is usually normal. Owing to the thickness and variable rigidity of the anterior abdominal

parietes, the movable kidney usually appears to be larger than normal.

As time goes on the floating kidney returns less and less readily to its proper place in the loin. Moreover, a displaced kidney may become fixed by adhesions in an abnormal position.

The movable kidney may become the seat of hydronephrosis. This is no doubt due to repeated kinking or acute bending or torsion of the ureter, whereby the escape of urine is more or less abruptly hindered. Such occurrences are marked by those acute symptoms which are generally ascribed to "torsion of the kidney" or "strangulation of the kidney."

Hydronephrosis may, however, occur in cases in which there have been no such acute symptoms of twisting or kinking of the ureter. On the other hand, the occurrence of acute attacks, presumably due to the condition just named, is by no means of necessity followed by hydronephrosis. In certain cases it would appear that there is an abiding narrowing of the ureter—owing, as some assert, to the fixing of the bent ureter by adhesions—and, as a result, a chronic condition of hydronephrosis.

The fact that a kidney has become movable does not thereby exempt it from such diseases as befall the undisplaced kidney, and the movable gland has been found to be the seat of calculus, of tuberculous disease, and of a malignant growth.

I think that some legitimate doubt may attach to the statement that in examples of movable or floating kidney the pulsations of the renal artery have been felt.

Diagnosis of Movable Kidney.—Without entering into the complex question of differential diagnosis it may be pointed out that the most common conditions which have led to confusion in association with movable kidney are Reidel's lobe, a distended gall-bladder, and a faecal mass in the colon. It is somewhat disconcerting to reflect that all these three conditions may co-exist with a movable kidney on the right side.

As a matter of experience I may say that when a doubt has existed as to whether a certain swelling is a movable kidney or a distended gall-bladder, it has more often proved to be the latter than the former.

Symptoms of Movable Kidney.—The symptoms ascribed to movable kidney are legion and include manifestations which

vary from mere peevishness of temper to agonising renal pain. There is no definite relation between the degree of mobility of the gland and the clinical phenomena associated therewith. A patient may have a kidney running wild in the abdomen and be at the same time free of any discomfort or of any trouble that can be called a symptom.

On the other hand, the very first evidence of a movable kidney may be associated with an acute "torsion" attack.

In the clinical history of movable kidney these attacks stand alone. They are usually sudden and intense, and are attended with acute renal pain, vomiting, abdominal tenderness, and a varying degree of collapse. Some are less abrupt, or may even be gradual in their mode of onset and moderate in their manifestations. Some are relieved by posture. Some pass off abruptly, and others slowly. A temporary hydronephrosis may attend the attack, or it may not.

Apart from these intense and alarming disturbances the symptoms ascribed by various writers to movable kidney may be said to include all those manifold ills which make up the melancholy history of the "enjoyers of poor health." There is scarcely an "abdominal symptom" which has not been placed to the credit of a floating kidney. Yet all the classical symptoms of this disorder may be present, and the kidneys be found to be firmly fixed in position.

As to what constitutes the classical symptoms of this disorder it is probable that they would be tabulated somewhat as follows. A sense of dragging in the abdomen, a dragging from the loin, attended with an undefinable discomfort and feeling of weakness. This discomfort may pass into actual pain, which pain may follow the lines accredited to renal pain, or may radiate down the thighs and legs and across the back. There may be some undue frequency of micturition, but this is uncommon. Added to this would be certain evidences of abdominal disturbance, such as dyspepsia, flatulence, and constipation. The symptoms are increased by movements, and especially by jolting, and the patient is disposed to walk and stand as little as possible. The relief when in the recumbent position is usually complete.

Over and above such manifestations as these come that congeries of troubles which belong to what is known as

" neurasthenia." Here we find a mysterious exhaustion, a terrorising palpitation, vertigo, irritability of temper, instability of purpose, neuralgias of more or less intense types, insomnia, and other symptoms, most of which are described in language of great intensity and vividness by the patient.

Not a few of the subjects of this trouble may be described as presenting an assertive peevishness and a whining type of melancholy which their friends describe as " trying." From the very precise account which Dickens has given of the mental attitude of Mrs. Gummidge it may be safe to assume that she had a movable kidney.

Among the less common effects of movable kidney may be mentioned, dilatation of the stomach, intestinal obstruction and jaundice. I have reported two cases in which the movable kidney reproduced with extraordinary exactness the phenomena of hepatic colic followed by jaundice. In both instances the condition was revealed by operation.[1]

Treatment of Movable Kidney.—The literature of this subject has, I think, rather encouraged the belief that the only treatment of movable kidney is by operation. The operation of fixing the kidney in position by suturing has certainly been very extensively employed and possibly with some little lack of discrimination. The risk of the procedure is very slight, and possibly the mortality of the operation at the present moment does not exceed 1 per cent. Dentu has collected 374 examples of nephroraphy with 7 deaths, but in only 4 out of this number could the death be ascribed to the operation. Keen, in a collection of 134 cases, finds the mortality to be 2·9 per cent.

An operation, however, is neither justifiable nor commendable on the sole ground that it is attended with small risk. I have come to believe the nephroraphy is by no means a routine measure in the treatment of movable kidney ; that it is, indeed, not demanded in the great majority of the cases, and that, with one exception, it is to be regarded as the last, and not as the first, resource.

The operation is not always successful. The methods of performing it are legion, but there is no procedure which can claim to be infallible or to be exempt from occasional failure. By the earlier methods of operating failure was common. My

[1] *Lancet,* January 6, 1900.

experience leads me to believe that by all methods a lack of success is more common than is supposed or allowed. In dealing with a series of reported cases it must be remembered that it is only natural that in such records the successful case should find a place which is often denied to the case that fails.

Keen, in reviewing a series of 116 cases at a period of not less than three months after the operation, considered that 57·8 per cent. only were cured, 12·9 per cent. were improved, while in 19·8 per cent. the operation had failed.

Apart from the mere failure to maintain the organ in place, the operation has been followed in certain instances by considerable neuralgia, sometimes in the renal region and sometimes extending down the back and outer side of the thigh and leg. As in stone of the kidney so after nephroraphy, pain of a severe character has, on occasion, been experienced in the heel or in the sole of the foot.

The operation, I venture to think, is imperative in cases in which there have been " torsion symptoms," and the sooner it is carried out in such instances the better. In cases in which the symptoms of movable kidney are those of the ordinary type and in which all measures of treatment—short of operation—have failed, nephroraphy may be considered; but I am under the impression that the instances of this kind in which the operation will be necessary will be exceedingly few. I venture to think that a time is not far distant when suturing of the kidney will become one of the rare operations of surgery.

The treatment that appears to commend itself in the management of a case of movable kidney, causing symptoms (short of those of "torsion"), is the following. Treatment by rest in the recumbent position, with careful feeding, precise attention to the digestive organs, and general massage.

The so-called "rest cure" carried out for a month has not caused the movable kidney to cease to move, but it has rid the patient of her symptoms. In a quite large proportion of cases neurasthænia is the major element in the train of troubles complained of, and the treatment of this condition alone has sufficed to cause the movable kidney to be forgotten. In such instances the mobility of the kidney is probably the least important factor, although it is the only apparent or palpable one. A lady who is worn out by the unceasing turmoil of a

London season, and who ascribes her many symptoms to a movable kidney, will often lose all her troubles after sufficient rest. The same may be said of the lady who hunts four days a week, and of the many women generally who "do too much."

While rest is not a panacea for all examples of movable kidney, it is at least an admirable preliminary to any more detailed treatment of the condition.

In 1895—at a time when, in common with other surgeons, I regarded nephroraphy as the only remedy for movable kidney —I was consulted by a lady whose objection to this or any other operation was such that that method of treatment was not discussable. I had already found that the many belts, pads and supports designed for movable kidney were either utterly useless or at least quite unreliable. Now and then one would meet with a case of movable kidney in association with a very pendulous abdomen and some general enteroptosis, in which a belt proved to be of value or gave satisfactory relief. In the case of the lady in question I found that the kidney, which was very mobile, could be kept in place by the hand in all positions of the body and even during such movements as are involved in violent coughing, &c.

I asked Mr. Ernst to endeavour to make a truss, upon a pattern I suggested, which would reproduce the pressure of the fingers. One instrument after another was made, but they all failed. Fortunately neither the patient's patience nor Mr. Ernst's ingenuity were readily exhausted, and in due course was produced the instrument shown in the woodcut.

The instrument consists of a thin carefully padded metal plate which exercises pressure upon the abdominal wall by means of two springs.

The pressure concerns the lower and inner margins of the plate, so that the kidney is forced upwards and outwards. It must of necessity be applied when the patient is lying down. It requires very careful fitting and adjustment, and it is useless to recommend the appliance to any patient who is not prepared to devote at least three or four sittings to the precise adjustment of the support. The instrument is light—weighing about six ounces—and is perfectly comfortable after it has been worn for a few days. Of its efficiency I can speak very definitely,

for since 1895 I have abandoned the operation of nephroraphy except in the following examples—cases in which there were torsion symptoms ; some cases in which the patient would be residing in the tropics, many hospital cases in which the patient had to work for her living and could neither indulge in a long-sustained rest nor properly manage a truss requiring some delicacy in its adjustment.
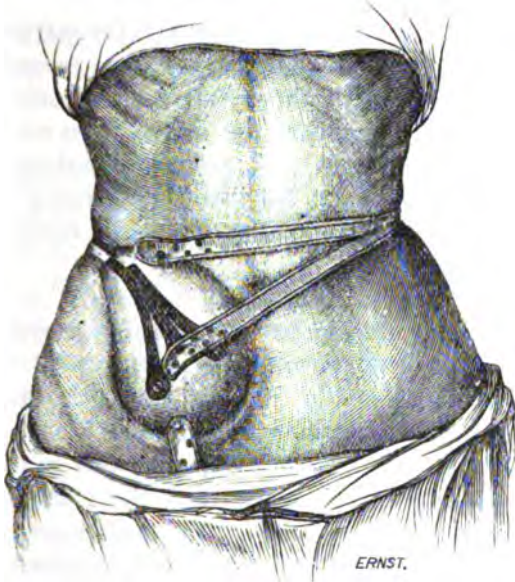
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Since 1895 Mr. Ernst informs me that he has made more than 300 of these trusses for me for patients in private practice. In 95 per cent. of the cases the truss has proved absolutely efficient ; the kidney has been kept in place and the distress that had existed has entirely vanished.

With the truss on the patient has been able to take active exercise, to ride and, in an occasional instance, to hunt.

It is needless to say that a truss will not cure neurasthenia. That condition must be dealt with by other measures. All that the truss claims to do is to keep a movable kidney from moving, and that—it may be pointed out—is all that the operation claims to do. In a large proportion of cases the truss can be given up at the end of 18 months or two years.

ON ZOMOTHERAPY IN PULMONARY TUBERCULOSIS.

By R. W. PHILIP, M A., M.D., F.R.C.P.E.,

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THE selection of a suitable dietary for the patient suffering from pulmonary tuberculosis is of the first moment. In no disease is it more true that the dietary must be selected with a view to the individual need of the patient. In no disease is it more certain that benefit will accrue according as care is expended in the selection. Nowhere is ignorance or carelessness more likely to prove disastrous, both immediately and ultimately, to the patient.

While there are many aspects of dietary in pulmonary tuberculosis which afford scope for interesting consideration and discussion, the present contribution is concerned chiefly with the use of raw meat in the treatment of such cases. Zomotherapy, as it has been termed by Professor Richet, consists in the *systematic, continued exhibition of raw meat in the treatment of the disease.* In strictest sense it is the treatment by raw meat-juice (ζῶμος = meat-juice). It is not a mere variation in the quality or quantity of the diet supplied, governed as such variation is apt to be by the varying temper or caprice of the patient ; it is a *therapeutic procedure* determined by the patient's needs in the light of experimental and clinical observation. In this sense the form and dosage are to be regulated in the way in which we regulate the exhibition of any drug. Incidentally it may be added that the method is applicable not only to tuberculous but to a variety of wasting conditions, particularly after certain fevers. It is likewise serviceable in gastro-intestinal disturbance, and generally in cases where for some reason the nitrogen out-put is, or has been, unduly increased, or where the nitrogen intake, on ordinary diet, is insufficient for the needs of the patient.

My interest in the subject is one of long standing. During the past fifteen years, raw meat in one or other form has formed a conspicuous factor in my treatment of tuberculosis.

Throughout the past four years, since the publication of Héri-
court and Richet's striking researches—strongly corroborative
as they were of one's more general experience—the exhibition
of raw meat has become almost routine treatment. During the
latter period it has been possible to make detailed observations
in more than two hundred cases. Recently, clinical observa-
tion has been supplemented by a more exact research, to which
I shall refer presently, undertaken at my request by Dr. J.
Galbraith, Research Scholar, in the Research Laboratory of the
Victoria Hospital for Consumption, Edinburgh.

EXPERIMENTAL OBSERVATIONS.

To Héricourt and Richet[1] we owe the first attempt to
place the method of Zomotherapy on a scientific basis. These
observers found, in the case of dogs inoculated artificially with
tuberculosis, that all such animals fed in the ordinary way
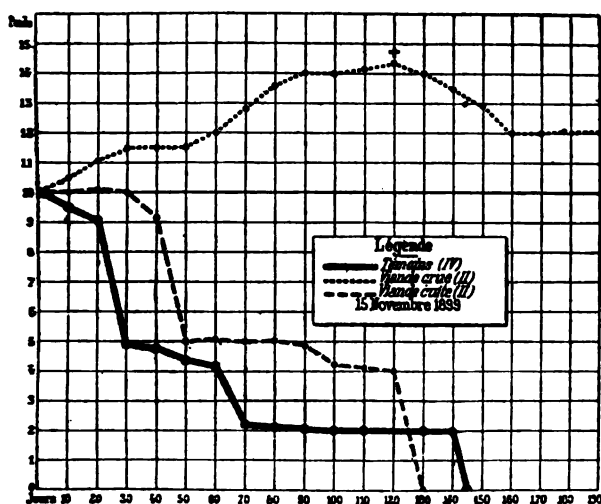
Fig. 1. (*After Richet.*) *Showing effect of raw meat dietary on
weight of tuberculous dogs* :—
———————— = *tuberculous dogs fed in ordinary way.*
- - - - - - - - - = *tuberculous dogs fed on cooked meat.*
. . . . = *tuberculous dogs fed on raw meat.*
+ *indicates point at which raw meat was stopped.*

[1] *Comptes Rendus de l'Académie*, CXXX., 1900.

speedily underwent a progressive emaciation, while animals fed on raw meat in one or other form, in place of emaciating, actually put on considerable weight. They found moreover that the muscle-juice freshly expressed from the meat was as efficacious as the meat itself. Cooked meat was of practically value. The accompanying plate (Fig. 1), after the original figure of these observers,[1] emphasises the above facts in a remarkable fashion. They also determined that, to be efficacious, the dose of raw meat must be sufficiently large in proportion to the weight of the animal. The efficacy of raw meat was established even in the case of animals almost *in extremis* from the disease. Similar observations, with most careful regulation of the amount of cooked and raw meat supplied respectively to two sets of tuberculous animals, were conducted by Cornil and Chantemesse[2] with like results. Several criticisms of the observations and counter-observations have been recorded, but none of these have sufficed to overturn the earlier observations. The latter are confirmed by observations made by Chalmers Watson, Galbraith, and myself on the effect of feeding tuberculous fowls with raw meat.

As to the *modus operandi* of raw meat, or muscle-juice, there is less certainty and still room for exact observation. As pointed out by Richet,[3] it is not a question of extra feeding, for in that case cooked meat should be as efficacious as raw meat. This we have seen is not so. The therapeutic efficacy of raw meat would seem to depend on the presence in the muscle-juice of certain ferments, or on the production within the animal under treatment of certain substances resulting from the special stimulation. In either case, the effective element appears to be destroyed in the process of boiling.

It is a remarkable fact in this connection that of all the living tissues of the body, muscular tissue is that on which the tubercle bacillus seems to find greatest difficulty of implantation and development.

The more recent observations of Galbraith were undertaken with a view to ascertain how metabolism in the tuberculous subject was affected by substituting raw meat for cooked

[1] *Revue de la Tuberculose*, VIII., 1900-01.
[2] *Transactions of the British Congress on Tuberculosis*, 1901.
[3] *Revue de la Tuberculose*, VIII., 1900-01, p. 42.

meat. Observations were also made on healthy persons. In this extended series of observations, the nitrogenous value of the food was maintained constant throughout, or as nearly so as possible. The results obtained are of much interest and importance and may be summarised as follows :—

(1.) The exhibition of raw meat was followed by a marked increase of nitrogen retention, provided the heat value and nitrogen of the diet exceeded the actual requirements of the individual per kilo. of body weight.

(2.) Intestinal metabolism was improved, an improvement which continued for some time after return to cooked meat.

(3.) There was a rapid increase in hæmoglobin. The amount of hæmoglobin rose in one instance from 90, its maximum during cooked meat feeding, to 120 during the exhibition of raw meat, falling again rapidly when cooked meat was recommenced.
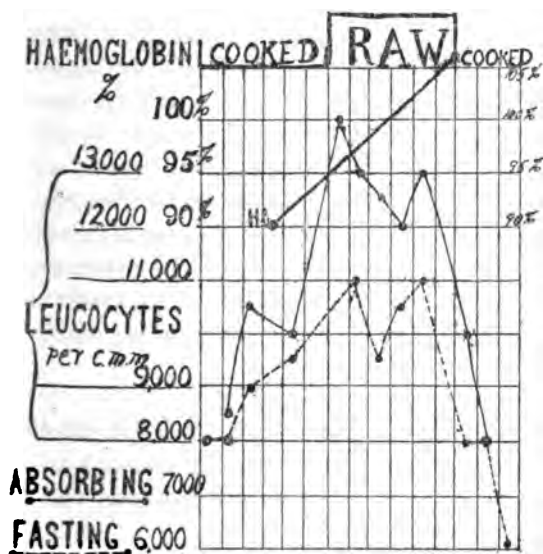
Fig. 2. *Showing effect of raw meat dietary on Hæmoglobin and Leucocytosis during* (1) *period of six days with cooked meat ;* (2) *period of six days with raw meat, followed by further period with cooked meat :—*

- - - - - - - - - = *Fasting leucocyte count.*
——————— = *Absorbing ditto.*
▬▬▬▬▬ = *Hb estimation.* (*Galbraith.*)

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(4.) Digestive leucocytosis (lymphocytosis) was remarkably increased, amounting in several instances to more than double the digestive leucocytosis occurring in relation to cooked meat. This increased leucocytosis is highly significant. It is conceivable that the benefit resulting from the raw meat dietary may be related to a leucocytic (lymphocytic) secretion, physiologically concerned in nitrogen fixation. As we have already seen, there is in tuberculosis excessive nitrogen waste. Cf. the great loss of muscular tissue and increased myotatic irritability, which is one of the early manifestations of the disease.

Several of these points are illustrated in the accompanying Fig. 2. A more extended account of the observations will be published in the February issue of this Journal.

CLINICAL OBSERVATIONS.

The experimental observations which have just been detailed are striking. Clinical evidence in favour of zomotherapy is no less remarkable. I have before me a large accumulation of results, and the clinical history of cases extending in some instances over many months and even years. It will be my endeavour to extract and summarise the leading features of these rather than narrate individual cases *in extenso*. In doing so, I recognise fully that other agencies were contributory to the results. The exact apportionment of credit is a matter of difficulty. So far as possible, it has been my endeavour to link effect with cause.

MODE OF EXHIBITION OF RAW MEAT.

It may be convenient in the foreground to indicate the forms and dosage in which raw meat has been exhibited. These are as follows:—

(1.) Pounded raw meat, *i.e.*, finely minced or bruised beef (mutton was seldom employed) slightly seasoned with salt, &c., according to taste, served *natural* like mince collop, cold or gently warmed throughout, say ½ lb. twice or thrice daily. Much advantage is to be had by using the meat *perfectly fresh*. Impressed by my experience, I have endeavoured to obtain the meat direct from the slaughter-house. For a time I made use of ox-heart, which was more easily obtainable quite warm.

This latter proved, however, less acceptable to the patients than ordinary raw meat, which is easily taken as a rule.

(2.) Beef-juice prepared as follows :—Extract ½ lb. of meat in ¼ pint of cold water + ½ teaspoonful of salt, for 1½ to 2 hours at 100° F. Express the liquid through a cloth, and serve. Or the juice may be expressed from the meat directly without the addition of water. This requires more powerful pressure. In either case the meat-juice must be *freshly prepared before use*, for, as Héricourt and Richet have shown, it speedily undergoes changes which detract from its value and tend to cause irritation of the gastro-intestinal tract.

(3.) Raw meat soup, prepared as follows : — Take ¼ lb. of finely minced *fresh* meat and mix in a bowl with sufficient milk to produce a thick uniform paste. Immediately before serving, add ¼ pint of milk at 150° F. In place of milk, the soup may be made in similar fashion with stock of beef or chicken or veal.

[(4.) Though not strictly in the same dietetic category, I include raw eggs. Recently I have prefaced patients' meals with one, two, or three eggs—*nature*-swallowed like oysters. Here, again, advantage is to be gained from the eggs being quite fresh, *i.e.*, newly-laid. The eggs should *not* be switched or mixed with milk or other ingredient, apart from a slight sprinkling of salt or pepper.]

In cold weather the chill should be taken from all these by gentle exposure to warmth immediately before use.

SUMMARY OF RESULTS.

It is not a difficult matter to accustom the patient to the use and even enjoyment of one or other of the raw products just described. My experience has been that very quickly patients get over any preliminary distaste. When they realise, as they speedily do, the advantages of the *treatment*, they take the raw meat with avidity.

The method is most serviceable in early stages of the disease. The records before me, however, include histories of numerous patients already *in extremis* before the treatment was commenced. With regard to one of these I have noted that the lady superintendent of the Victoria Hospital, who has had twenty years' experience of nursing, remarks she cannot

recall any case which seemed to her more certainly moribund when treatment was undertaken. The patient had a highly irregular temperature, oscillating between 97° F. and 103·8° F. His pulse-rate ranged from 98 to 120. Both sides of the chest were much involved, with abundant moisture and large areas of cavitation. There was pleural effusion at one base. His gastro-intestinal system seemed hopelessly to pieces. Dyspnœic and cyanosed, he presented all the aspects of a dying man, so that his friends were summoned from a distance. In this low state I instituted treatment with nine raw eggs per diem, and continued the raw meat which he had commenced some time before. From that date his condition steadily improved. Within a few weeks his temperature became normal—a condition which has continued ever since. (He is still under observation.) His pulse-rate varies now from 64 to 80 per minute. He has put on, and continues to put on, weight. His anæmia has disappeared, and he presents the aspects of a healthy man. Physical examination of the chest reveals not a trace of moisture anywhere. Certain areas remain, of course, more or less dull.

A similar record occurs in the case of a female patient who, in addition to lung symptoms, presented evidence of intestinal involvement. The gravest prognosis had been given by several physicians in succession. In her case, beef-juice and raw meat-soup, exhibited thrice a day, formed the main part of treatment. Gradually symptom after symptom yielded. Now she manages her household, and goes about in pretty much her ordinary fashion.

Regarding such instances, I have no wish to claim everything for the system of treatment under review. I admit fully that other factors played a part in the gratifying change. But, making a wide and impartial comparison and appraisement, it is impossible to disassociate the remarkable results from the particular method.

It would be tedious to detail individual cases. The purpose of the present paper will be better served if I extract some of the more conspicuous changes determinable in the series of records.

(1.) *General Aspect.*—The patient's colour quickly improves. The pale, anæmic look disappears. The tissues gradually— often rapidly— assume a firm, vigorous character. This is

dependent, in part, on the increase of hæmoglobin, already referred to, and in part on the improved state of the muscles (v. i.).

(2.) *Weight.*—Too much stress must not be laid on mere gain of weight in relation to tuberculosis. Under the system of extra feeding, in the cruder sense sometimes practised, patients rapidly become stouter. The increase is due to an overlading with fat tissue. Such fat increase is of doubtful value to the patient. In many cases it is positively harmful. The unfortunate individual moves about with increasing difficulty, and suffers not a little from dyspnœa. It is frequently necessary to run off, as I picture it, such semi-fluld fat, and thus for a while allow the patient to drop weight. Thereafter, on the régime we are discussing, his weight gradually increases— *an increase which is accompanied by firmness of tissue.* Such gain in weight may amount to from 10 to 30 lbs. or more.

(3.) *Muscularity.*—The gain in weight and improved tone are associated with a remarkable increase of muscularity. The soft flabby muscles gradually fill up and become firm. This is a much more satisfactory test of improvement than increase of adipose tissue. With increasing firmness of muscle the patient's vigour and sense of well-being improve correspondingly. Myotatic irritability—so characteristic a feature in pulmonary tuberculosis—tends to lessen, and in many cases finally disappears. The patient feels fit and keen for active effort, and the effort, when not in excess, still further benefits him.

(4.) *Circulation.*—The effect of the régime on the circulation is rapid and striking. Within a week or two a reduction in pulse-rate may be noted, and a corresponding improvement in blood-pressure. The occurrence of this is one of the best indications that the treatment is proving effectual. These circulatory phenomena are presumably the expression of improved muscularity of the heart and improved tone in the muscular walls of the vessels, just as contrariwise the reduced muscularity, with increased myotatic irritability and a rapid, feeble pulse, are indications of advancing disease.

(5.) *Temperature.*—Elsewhere [1] I have had something to say about the significance and variations of temperature in pulmonary tuberculosis. Here I content myself with the

[1] PRACTITIONER, May, 1902.

statement that the temperature tends to improve. The improvement may occur quickly. In some instances a highly irregular (remittent, intermittent) temperature gives place within a week or two to an almost uniform range about the normal level. It is of course not to be expected that all temperatures yield so rapidly. None the less it is true that zomotherapy influences pyrexic disturbance most favourably.

(6.) *Gastro-intestinal Functions.*—The functions of stomach and bowel are rendered easier and more effective. Gastric uneasiness, pain, dyspeptic phenomena, and flatulence tend to lessen. Intestinal metabolism is rendered easier and more complete, as may be judged by the improved character of the stools. Such improvement is frequently succeeded by fall of temperature.

(7.) *Blood.*—The blood presents a rapid increase in hæmoglobin. This is marked even in patients doing fairly well on an ordinary cooked diet, when they are placed on a raw meat régime. Within a few days the hæmoglobin runs up 10—20 per cent. (*vide* Fig. 2), falling comparatively quickly if return be made to cooked meat. The remarkable increase in digestive leucocytosis (lymphocytosis) and its possible bearings on the arrest of the disease have already been considered (page 18). In no instance have I seen hæmoptysis follow the institution of the method. Indeed hæmoptysis has seemed to me relatively uncommon during the treatment. This is important, because some authorities have forbidden the use of meat or insisted on its extreme limitation in case of hæmorrhage.

(8.) *Local Lesions.*—The benefit derived from the treatment is conspicuously seen in relation to the local lesions. The symptoms of disease become less clamant. Within the chest, physical signs indicating present activity (pulmonary, pleural) and disintegrative changes are gradually replaced by signs of quiescence and cicatrization. I should have much liked, had space permitted, to reproduce in print the diagrams of physical signs before and after treatment, which afford convincing evidence on the point. Similar improvements, if less conspicuous in extent, have been recorded by me in relation to the larynx, glands, and intestine. Tubercle bacilli gradually lessen in the expectoration and other discharges and assume a degenerate aspect.

SUPPOSED DISADVANTAGES.

It has been my endeavour in the foregoing statement to avoid exaggeration of what have appeared to me truly remarkable results. With increasing experience of the method and its possibilities, I am confirmed in my belief as to its value. The only disadvantages which have been urged are (1) The natural distaste which many persons have to such raw products, and (2) the possibility of the introduction of intestinal parasites along with the raw meat. The latter danger is not a likely one if reasonable care be taken in the selection of meat. The possibility admittedly exists. Even if a parasite be so introduced, the actual harm to the patient is infinitesimal compared with the risk involved by the presence of the disease. It may be fairly assumed that this will be the patient's view. The other objection—the natural repugnance of the patient—has, in my experience, still less validity. So soon as the patient grasps the fact that zomotherapy constitutes *a definite and special treatment of his disease,* and is not a mere dietetic fad, his repugnance speedily yields. In many cases it is transformed into a positive liking for raw meat. In this respect his gustatory education proceeds on lines already well recognised from his infancy onwards.

DIET IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

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ACCORDING to our present knowledge the most effective agents that can be used for the arrest of consumption are fresh air, prolonged rest, appropriate feeding and medical regulation of the patient's whole life.   It is in regard to the factor—diet— that most room is allowed perhaps for differences of opinion and practice.

All sanatorium workers are in theoretical agreement about the advantage of surrounding the patient with an unlimited supply of fresh air—though parenthetically I must remark that many buildings used for the treatment do not comply, in my opinion, with this principle of unbounded air supply. Sanatorium workers are also unanimous in holding that, under certain conditions, the factor *rest* cannot be used too strictly, and the general directions given to patients at different sanatoria are pretty much the same.

But the feeding of the patients at one establishment has differed considerably from that at another, and the prevalent notion of what is right in regard to this factor has undergone considerable change of late.   A few years ago we heard a great deal of talk about "over-feeding" in the sanatorium treatment of pulmonary tuberculosis. Now, however, the majority of physicians have come to the conclusion that, unlike the application of fresh air, and of rest in suitable cases, in the matter of their feeding it is possible to err on the side of excess.

According to my own experience the best results in the treatment of pulmonary tuberculosis are obtained by the administration of moderate amounts of food.

Over-feeding has certainly done actual harm.   As was only to be expected, the stomach was liable to be dilated and its powers of digestion permanently ruined. Apart from the risk of over-straining the organs of digestion, the general health may suffer in consequence of too much addition to the body's

weight. The cardio-vascular balance becomes deranged and the already feeble heart is unable to perform the extra work necessitated by the more ponderous frame.

With even slight additions to the patient's ordinary dietary it is common to see some acceleration of the pulse-rate. We shall have occasion to refer presently to this point and will only state here that the heart's action may be markedly hurried by increasing the amount of nourishment administered to a patient.

Lastly, it must be pointed out that great increments of weight alone do not signify that the tubercular processes are necessarily being checked. It is well known that steady progress of the disease may be going on all the time that weight is being gained. By almost general consent, it is now allowed that no useful purpose is served by the indiscriminate stuffing of the consumptive patient, but that actual harm is done thereby. The aim of the dietetic treatment of pulmonary tuberculosis at the present time is to improve the patient's nutrition, while the functions of digestion and assimilation are simultaneously improved. By means of food it is sought to bring up the body-weight to a level which appears to coincide with the best general health, to enrich the blood and thus increase the powers of resistance to disease. This measure is always to be carried out with due attention to the condition of the alimentary canal. So far from over-taxing and injuring the organs of digestion, these should share in the benefit brought about by an increased dietary. These favourable results are to be accomplished, I think, by the administration of an only moderately increased amount of food.

From early times it has been taught that the consumptive benefited by being well fed, and that fat and oil were particularly valuable. But the physician was content to give the advice in general terms that his patient should eat plenty of good food, and did not recognise that the difference between success and failure might depend upon precision and insistence. In the past the amount of nourishment consumed was almost wholly regulated by the appetite or by the interpretation placed on the physician's directions. The principle which underlies the modern sanatorium treatment depends upon the fact that the consumptive's appetite cannot be relied upon as

a guide to his requirements, but that definite quantities of the different food-stuffs must be introduced into the body according to certain indications. As in other branches of the sanatorium treatment, the advance recently made largely consists in attention to detail.

If the best results are to be obtained from treatment the physician must take steps to improve the patient's nutrition, and to stimulate the appetite and digestion. These ends are commonly gained by insisting upon the ingestion of certain weighed amounts of food, which amounts probably represent an increase on what the patient would take of his own accord, though they are only a slight advance on a healthy person's normal diet. It goes without saying that the beneficial effects of an improved dietary are always assisted by those of the open-air life, the rest, and other items of the sanatorium system.

Let us now consider what are the indications, commonly speaking, in regard to the regulation of the consumptive's dietary :—

I. The patient is below his proper weight. In all probability the amount of food eaten has been insufficient to prevent loss of weight and the waste of tissue dependent upon active disease has been unchecked.

It is a good rule to ascertain the patient's maximum former weight in health, and to aim at bringing him up to about half a stone above this. I have a space left on the chart for the purpose of recording each patient's maximum known weight, this enables me to see at a glance what is required from time to time in the matter of additional weight.

The information afforded by the former weight is checked by reference to statistics giving the average weight for normal individuals according to their height and development. It is often found that even in health the patient's weight was low, and in this case the acquirement of a heavier build and the direction of the consumptive's attention to the point may serve as a useful prophylactic measure.

Lastly, the physician must use his judgment as to the weight which coincides with the fullest amount of bodily health and vigour for the individual under consideration.

II. Moderate activity of the disease, as evidenced by

extension of the lesion in the lungs and especially by the persistence of fever and other constitutional symptoms, affords a distinct indication for reinforcing the patient's nourishment. There may be considerable elevation of the temperature, and yet large meals of solid food are found not only to agree with the stomach but to actually improve the general condition. While moderate degrees of fever form no objection to full feeding in pulmonary tuberculosis, the same cannot be said about higher ranges of temperature. When 102° is exceeded or when there are other manifestations of acuteness of the processes present, the diet may require considerable modification. Even then, however, larger quantities of easily digested nourishment should be administered than in other maladies attended by the same amount of fever.

III. Under certain conditions the actual existence of anorexia and dyspepsia call for increased food. Not only does the stomach participate in the improvement of nutrition caused by better feeding, but it appears that the stomach can be roused to greater activity by increasing the demands made upon it.

Having stated the indications for attempting to increase the weight of the consumptive patient, let us next inquire into the effects upon the disease of improvement of nutrition.

There are good grounds for holding that a well-nourished state of body constitutes some protection against the tubercle bacillus. " The experience of the United States Life Assurance Company shows that the mortality among the assured who were 15 per cent. and more under weight was 61·2 per cent. in excess of what was expected, this increase being to a great extent due to consumption, 59·5 per cent. of the deaths amongst the underweights arising from this disease." [1]

The corpuscular richness of the blood is increased with improved nutrition of the body, and it may be assumed that the organism's powers of resisting the disease are thus strengthened. We have seen that increments of weight by themselves do not necessarily indicate subsidence of the malady, but taken along with other favourable symptoms the ready making of flesh is a good sign in pulmonary tuberculosis. The sanatorium treatment aims at bringing every measure to bear which will

[1] "The Medical Selection of Lives for Assurance." F. De Havilland Hall. *Westminster Hospital Reports,* Vol. V.

improve the general state of health. It is found that in this way the disease in the lungs can be most surely reached. Improvement in the pulmonary lesion follows improvement in the general health. It may be stated, generally speaking, that the patients who gain weight easily—that is to say, without excessive amounts of food—do well. Looking through the notes of a large number of patients treated at two sanatoria, I am impressed with the fact that those who made large gains of weight—say 20 lbs. or more—almost invariably secured satisfactory arrest of their disease ; and what is more, I find that their after progresses compare very favourably with those of patients who gained less weight. Of course it may be argued that patients readily gain weight whose disease is of a mild or favourable type ; that they gain weight easily because they are doing well.

It may be held that the gain in weight is not a factor in their amelioration, but only a result, and that the physician's efforts over their feeding played an unimportant part. In a certain proportion of cases of pulmonary tuberculosis the other items of our treatment suffice to bring about recovery, while the patient only follows his own inclinations as regards the quantity and quality of his food. The unaided effect of the fresh air and of the rest may be to render appetite and assimilation satisfactory, and no alteration may be required of the patient's accustomed dietary. In the majority of cases, however, I am satisfied that better progress is made when the consumptive is persuaded to eat slightly more than his natural appetite prompts him to do. In many cases the only thing wanted to promote restoration may be the improvement of the patient's nutrition through the agency of an altered dietary.

In the treatment of pulmonary tuberculosis, unless the weight is already satisfactory, or unless some contra-indication is present, the physician seeks to make his patient gain weight. Until the weight is reached which is judged to be proper for the individual, it is satisfactory to see flesh gradually gained week by week. Frequently larger gains are made during the first few weeks of treatment, while weight is added more slowly afterwards. Though half a stone or more may be made in a week, a gain of about two pounds is quite satisfactory. So long as such gains of weight are recorded week by week the

physician may be content with the effect of his dietetic measures, and no change will be required, provided that the stomach is also apparently suited. To obtain the increase of weight, it is not merely a matter of progressively enlarging the consumptive's meals. By observation of the stools and of symptoms connected with the stomach, it must be ascertained that the processes of digestion and assimilation are satisfactory. Our object is to increase the weight with the smallest addition to the amount of food which is found sufficient for the purpose. The preservation of a healthy stomach is as important a matter as the gain of weight. Supposing that flesh fails to be added by the patient, and no derangement of digestion or assimilation is apparent, the amount of one or more of the items of food are increased.

But sometimes the fault resides entirely in the state of the alimentary tract. The diet does not require enlargement, but modification. The unsuitability of excessive amounts of food is occasionally demonstrated by the fact that the patient refuses to gain weight until the diet has been actually reduced. I have observed this to happen, and the dietary which I shall recommend as a useful standard for the feeding of consumptives is of only moderate size. It has, however, proved sufficient in quantity to add the required amount of weight in a large number of consumptive patients.

It is easy to prove that increase of weight accompanies improvement of general health, and to assume that the powers of resisting and overcoming the bacillus are thus reinforced. The patients whose weights are good maintain their ascendancy over the disease better than those whose weights are low. It would therefore appear probable that the most important symptom of pulmonary tuberculosis—fever—should be influenced by states of nutrition.

By many sanatorium workers full feeding is regarded as the active agent for the reduction of fever ; in fact, at some institutions, chief reliance is placed upon large amounts of food for the conquest of inveterate pyrexia. For myself, I am inclined to credit full feeding with less definite action on fever than air and rest, and what action it has in this respect cannot be demonstrated so distinctly. We have seen that in general the acquirement of a good weight assists the patient to

withstand the disease. We must infer that as an improved state of nutrition represents improved powers of resistance, so some effect must be exercised on fever by adding to the patient's weight.

In the case of the other agents used for the reduction of fever, their effect is often immediate and unmistakeable.

On placing the febrile patient in bed and confining him strictly to rest, a drop in the temperature can almost be relied upon. The patient abandons rest and the fever rises again, once more to be definitely lowered by returning to bed. There can be no doubt about cause and effect in such cases. With varying degrees of exposure to the open-air the comsumptive patient's temperature may be affected with almost equal delicacy, but the reduction in consequence of more exposure is neither so constant nor always so prompt.

Though I do not doubt but that improvement of the febrile patient's nutrition tends to counteract fever, the effect is not so striking nor is it uniform. I have found it very difficult to satisfy myself as to the exact part played by gain of weight in the reduction of the fever of pulmonary tuberculosis, though for the last year or more I have been making observations on the subject. My own experience goes to show that in an immense majority of the cases in which fever becomes reduced, weight is also freely gained.

But the sequence of these two events is different in many cases. In one group weight is progressively and materially increased from the first, while fever is not reduced until much later. In another group increase of weight and reduction of fever begin simultaneously and proceed *pari passu*. These two groups are about equal in size and include the greater number of cases under consideration. In a smaller number of cases fever gradually becomes reduced without any appreciable gain of weight having occurred; only after a normal temperature has been secured is flesh made, and then perhaps rapidly.

Unfortunately it is very common to witness the occurrence of considerable increments of weight without any alleviation of fever.

It appears to me, therefore, that the cause and effect relationship between increase of weight and reduction of fever

in all cases of pulmonary tuberculosis cannot be determined. It is probable, however, that our efforts at reinforcing the patient's nutrition are of service against fever, even though large gains of weight are not immediately noted. Up to this point the consumptive was presumably losing weight, and if this loss is checked an effect should be exercised on the morbid processes.

In the presence of obstinate fever it is our first duty to adopt those measures which are undoubtedly active in this condition. The patient must be kept strictly in bed, and his exposure to open-air increased until, if necessary, he spends night and day out of doors and avoids the use of any ordinary room, no matter how widely its windows are opened.

I have dwelt on the other factors in the treatment of pulmonary tuberculosis in a small volume which is now in the press, and I am here only concerned with the feeding of these patients. As an adjuvant to our other measures, the effect of increased feeding must be resolutely tried in cases of refractory fever. While the temperature shows no inclination to come down, gradual additions must be made to the amount of nourishment administered until the limits of toleration of the stomach are reached.

I would only remind the practitioner that the assimilation of large quantities of food is our object, not its mere ingestion. He must satisfy himself on this point by the inspection of the stools, to see that food is not being passed along the bowel unaltered. Care must also be taken that the stomach is not over-taxed. Occasionally fever is contributed to by the deranged state of the stomach and lessens when the dietary is diminished.

Lastly, the existence of anorexia and dyspepsia may call for an increase of the amount of food. Few effects of the open-air life are more striking than the rapid disappearances in most cases of signs of disorder of the digestive tract. The new conditions of life are found to clean the tongue and to remove anorexia and dyspepsia. Fever may have been the obstacle to satisfactory appetite and digestion, and supposing this to have been conquered by the other items of the system, the patient naturally begins to eat and digest his food well. The failure of appetite and digestion may depend upon the stomach

being affected with the same debility which depresses the general vitality. In such cases it is important to observe that forced feeding is actually the means of curing anorexia and dyspepsia. Not only does the stomach participate in the gain of strength brought about by the absorption of more nourishment, but, as in the analogous cases of neurotic failure of appetite and digestion, it can apparently be roused to greater functional activity by increasing the demands made upon it. After a few days' study of the patient it is easy to discriminate between the anorexia which depends on insuperable failure of the stomach and that which will yield to determined persuasion along with the other factors of the sanatorium system.

Thanks to the valuable researches of Dr. F. W. Goodbody, Dr. Noel D. Bardswell, and Mr. J. E. Chapman,[1] the subject of feeding in pulmonary tuberculosis has now been placed on an accurate and scientific basis. Their investigations, which serve as guides in the practical arrangement of dietaries for consumptives, were conducted on six patients, with the object of ascertaining " the effects of over-feeding on their metabolism, and the maximum amount of food which they could take with advantage, and without causing too great a strain on the organism from a clinical point of view."

Commencing with the dietaries on which the patients were originally found, and which presumably represented the amount consumed when they were guided by their natural inclinations alone, successive additions to this dietary were subsequently made. The exact weight of all food-stuffs eaten was noted, and the urine and fæces were always, collected and weighed. The investigators ascertained what proportion of the different amounts of food was absorbed. They found that up to a certain point an increase in the amount of food eaten was actually accompanied by an increase in the percentage absorbed. But when this point was passed, though more food was being ingested, a smaller percentage was being absorbed. This, of course, necessitated the passage of a large amount of material through the alimentary tract to no purpose, and, it may be assumed, to the detriment of those organs. It is anyhow recorded that the patients then suffered from anorexia and dyspepsia.

[1] Vol. LXXXIV., *Med. Chir. Society Transactions.*

These experiments tend to show that "the most suitable diets for patients suffering from pulmonary tuberculosis that we had the opportunity of observing consisted roughly of about—

             120 grammes of proteids.
             140   ,,   ,, fats.
             300   ,,   ,, carbo-hydrates."

Translating these amounts into English weights, we should arrange the consumptive's dietary so that it contained about—

             4¼ ounces of proteids.
             5   ,,   ,, fats.
             10½   ,,   ,, carbo-hydrates.

This dietary may be compared with that laid down as a physiological one.

Sir Michael Foster, basing his conclusion on information derived from a variety of sources, states that a healthy man ordinarily takes—

From 100 to 130 grammes of proteids.
   ,,   40 to 80   ,,   ,, fats.
   ,,   450 to 550   ,,   ,, carbo-hydrates.

The dietary recommended for the treatment of pulmonary tuberculosis is characterised chiefly by the large amount of fat it contains. It has always been held that it is desirable to include plenty of oil or other fatty food in the consumptive's dietary, and the experiments of Goodbody, Bardswell, and Chapman showed that fat is peculiarly well absorbed by them.

There is but little difference between the amount of proteids in the healthy man's diet and in that of the consumptive patient. It must be remembered, however, that the patient has probably this advantage over the healthy man, that he is taking no exercise.

The above dietary closely resembles that which I will call the standard diet for pulmonary tuberculosis. It represents the smallest amount of food on which the majority of patients may be expected to gain weight and make satisfactory progress. At the same time a very large proportion of favourable cases of pulmonary tuberculosis will be found to do well on the dietary. An average gain of about two pounds a week may be said to occur, and improvement in the pulmonary and general condition is as marked, generally speaking, when this moderate

                                                       c

amount of food is being consumed as when much larger quantities are being forced down.

The advocated standard daily dietary comprises :—

	Approximate Value.	
	Proteid.	Fat.
Meat, 4 to 5 oz. - - -	1 oz.	$\frac{1}{2}$ oz.
1 Egg, 2 oz. - - -	$\frac{1}{4}$ „	$\frac{1}{6}$ „
Milk, 3 pints - - -	2 „	$2\frac{1}{2}$ „
Porridge, plateful - -	$\frac{1}{3}$ „	—
Bread, 8 oz. - - -	1 „	—
Butter, 2 oz. - - -	Trace	$1\frac{1}{2}$ oz.
Potatoes, &c., 4 oz. - -	—	—
Puddings - - -	—	—
Total about -	$4\frac{1}{2}$ oz.	$4\frac{1}{2}$ oz.

The approximate values of the different items in proteid and fat are given, so that the practitioner may be able to keep to the proper quantities of the essential substances when he changes one article of food for another.

These amounts may thus be distributed through the day :—

Breakfast :—

Porridge or bread and milk.

1 Egg. Bacon or ham or fish, &c. -	- 1 oz.
Bread. Butter - - -	- $\frac{1}{2}$ „
Tea, coffee, or cocoa. Milk -	- $\frac{1}{2}$ pint.

11 a.m. :—

Milk - - - -	- $\frac{1}{2}$ „

Lunch : —

Meat - - - -	- 2 oz.
Bread, vegetables, puddings. Milk -	- $\frac{1}{2}$ pint.

Tea :—

Tea, coffee, or cocoa. Milk -	- $\frac{1}{2}$ „
Bread, biscuits, &c. Butter -	- 1 oz.

Dinner : —

Meat - - - -	- 1 to 2 oz.
Bread, vegetables, puddings. Butter	- $\frac{1}{2}$ oz.
Milk - - - - -	- $\frac{1}{2}$ pint.

Bedtime or on waking :—

Milk - - - -	- $\frac{1}{2}$ „

The amount of meat named is in the cooked form. Four or five ounces of this article of food may appear insufficient to many physicians. I only put it forward as an amount on which the larger number of patients do well. No one dietary can of course be framed to suit all patients. The above quantities represent the least that should ordinarily be insisted upon at the commencement of treatment. No alteration need be made if the patient steadily gains towards the reqnired weight and finds his stomach and other conditions suited by the dietary. But supposing that weight fails to be gained or the symptoms, such as fever and strength, are not improved, the original quantity of food is increased.

If the meat has so far been well digested, its amount may be gradually increased until perhaps seven or more ounces are taken daily. If the patient presents symptoms of inability to digest more meat, it may be partly or wholly replaced by other nitrogenous articles of food.

The above-mentioned arrangement of the consumptive's daily dietary is only given as an example. Endless variations may of course have to be made to suit particular tastes and constitutions. For instance, many authorities consider that it is better to give the patient no sort of nourishment between the three chief meals of the day. In this case it is wise to give more milk with each meal, for we are all agreed upon the value of this article in the treatment of pulmonary tuberculosis. By its use the discharged patient is usually enabled to maintain a weight of safety, and without doubt the maintenance of such weight constitutes an invaluable means for preventing recurrence of the malady. For information upon the comparative value of fish, chicken, and other substitutes for meat, I would refer the reader to Dr. Robert Hutchinson's useful work upon " Food and the Principles of Dietetics."

In addition to the substances already mentioned certain foods are particularly valuable for the consumptive patient. For those with whom they agree, eggs may be ordered in large numbers. I believe that many patients owe their satisfactory condition to their ability to consume several eggs daily. Cream and various forms of oil are highly esteemed in the treatment of consumption, and may be given in such amounts as are tolerated, when weight is not easily gained without them. The

secret of success in this branch of the work is precision on the part of the attendant.

We have seen that the patient's natural inclinations are not to be allowed to serve as the guide to the amount of his food. If, as is usually the case, the patient's restoration can be materially assisted by an improvement of his nutrition, it is advisable for the physician to be precise in his directions as to the quantity of food required by the individual. The patient's own judgment often leads him to take amounts which fall far short of what experience tells us is necessary for the reinforcement of his resisting powers. The important items of the patient's food, therefore, should be ordered in definite amounts, and the nurse should be instructed to adhere as closely as possible to these amounts. If the quantity of food consumed is known, and the desired results are not obtained, variations can be made according to certain indications. The person responsible for the patient's meals should learn to estimate at sight the proper weights of the several articles of diet. Ordinary letter-scales do very well for the purpose, and with a little practice the specified amounts of meats, butter, and fish can be guessed sufficiently accurately. The feeding of English consumptives is, in the majority of cases, carried out with little or no difficulty. The patient is made to understand the rationale of being asked to eat and drink more than he is naturally disposed to do. With the exercise of a little persuasion and tact on the part of the attendant, most patients will be found to readily comply with this part of the treatment, when they see that it is regarded as a serious part of the system.

There are, of course, unfortunately, a certain number of patients, the feeding of whom conducted on these lines presents insuperable difficulties. A little observation readily distinguishes the subject of serious anorexia and dyspepsia from the patient whose digestive symptoms will yield to a little stimulation. In the former class it is always doubtful if treatment will avail much. The diet will have to be considerably modified from time to time, and the ordinary articles of food may have to be replaced by those that are easier of digestion. If fever is present it must always be remembered that only its disappearance may be required to remove the refractory dyspepsia and

loss of appetite. In any case, we should always persevere with our efforts at maintaining the patient's nutrition at as high a level as possible. It is in dealing with difficulties of digestion that drugs find, I think, their most useful place in the treatment of pulmonary tuberculosis. Space does not allow me to do more than mention that the remedies ordinarily used in the management of dyspepsia are of unquestionable value in sanatorium treatment. Neither can I enumerate all the articles of food which may be used to replace those in the ordinary dietary which are found to disagree.

Milk is probably the form of nourishment on which we should first fall back. So obvious are the advantages which attend its use in consumption that we can hardly afford to omit it from the patient's dietary.

It is infinitely rare to find that, given in one form or another, milk does not agree. The most generally successful plan is to add about twenty grains of bicarbonate of soda to each tumbler of milk.

It is by varying the quantity of milk that we can most readily affect the ordinary patient's weight. When the more solid forms of nitrogenous food cannot be digested, and fish and chicken and other substitutes have been tried we shall have to rely largely on milk. Supposing we had to confine our patient to a wholly milk diet, over seven pints daily would be required to supply the necessary four and a half ounces of proteid. It would probably be better to give in most cases a smaller quantity of fluid and then to make good the deficiency in proteid by having recourse to some of the concentrated forms of invalid food. Casumen and Plasmon contain, it is said, the same amount of proteid as four times their weight of meat. They have proved themselves valuable in helping the consumptive patient to make weight.

THE PRINCIPLES OF THE DIETETIC TREATMENT OF PULMONARY TUBERCULOSIS.

By ARTHUR LATHAM, M.A., M.D., F.R.C.P.,

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To many minds the open-air or hygienic treatment, concerning which so much has been written of late years, stands as something complex, and as something having a peculiar and almost specific relation to consumption. The hygienic treatment is, however, just as useful in conditions such as anæmia, malnutrition, and syphilis, as it is in tuberculosis. This contention is borne out by the fact that, in fighting tuberculosis, our chief aim is to raise the resistance of the body to such a degree that the body-cells and fluids are capable of dealing with the tubercle bacilli, and of repairing the damage which the tissues have already sustained. The phrase " to raise the resistance of the body " means nothing more nor less than the endeavour to place the individual under ideal conditions with regard to fresh air, good food, and the avoidance of fatigue.

Such conditions cannot be said to be peculiar to the treatment of consumption. Still, the simplicity of them all seems to be in danger of being overlooked ; and of late this applies more particularly to the question of diet. It cannot be said that the question of diet is of more importance than fresh air, or the avoidance of fatigue. Diet remains, however, of prime interest in the treatment of consumption ; and on this ground merits an article to itself, in spite of the fact that the fundamental rules which govern it are so simple.

One of the most marked and constant features of tuberculosis is loss of weight. This loss of weight is borne by all the tissues, but the loss of fat is most apparent. In the dietetic treatment of consumption food must be given, to supply not only the normal wear and tear which takes place in any animal body, but to take the place of the additional daily waste brought

about by the action of the tuberculous toxin, and to make good the weight already lost. We have also the indication that fat must be well represented in the diet we prescribe. It is not enough to prescribe the diet we would give to a healthy individual of the same weight, for the consumptive is below weight, he is daily losing weight owing to his disease, and he is deficient in fat. A tuberculous individual in some respects may be regarded, for our purpose, in the same light as a schoolboy. A growing schoolboy weighing 9 stone requires more food than a man of 40 of the same weight, for the simple reason that in the first case there are more calls on the assimilated food than in the latter. Cornet has brought forward a theory which gives us another reason for prescribing rather large diets. He suggests that the rapid wasting of the tissues tends to hasten the absorption of proteins surrounding the tuberculous foci, and thus not only inhibits the natural process of healing, which is due to fibrotic changes, but furthers the distribution of the bacilli.

The composition of the diet in many cases of consumption is very similar to what it is in health. We know by means of experimental research that a healthy adult of average weight and build requires a supply of 3,000 to 3,500 calories daily, to meet his expenditure of energy. The expenditure of a consumptive is somewhat higher. We know also that in health some 20 grammes of nitrogen and some 320 grammes of carbon must find a place in the daily food. Tables are published which show the caloric value of various foods, the percentage of the chemical constituents which each contain, and the amount of each constituent which is absorbed in the process of digestion. It is therefore comparatively easy to arrange diets which will give the necessary number of calories and the required amount of nitrogen and carbon.

Scientific data show that a mixed diet is better digested and absorbed than any single food. For example, a mixture of bread and milk is better absorbed than either of the constituents when given alone. The science of dietetics is, however, not yet in a position to tell us the relative quantity of these substances which we require. To gain this information we have to turn to the results obtained from an analysis of diets actually taken by healthy individuals. Experience here is, perhaps, a

better guide than science. The results of such an investigation
show that each day a man of average weight requires :—

Proteid - - - - -	120 grammes
Carbo-hydrate - - -	500 „
Fat - - - - -	50 „

Authorities differ in the amounts, more especially of the
fat and carbo-hydrate, but these figures approximately represent
the average.

Waller's diet may be regarded as a standard for a man
doing a moderate amount of muscular work :—

───	Carbon.	Nitrogen.
Foundation, 1 lb. bread - - -	117	5·5
½ „ meat - - - -	34	7·5
¼ „ fat - - - -	84	—
Accessories, 1 „ potatoes - - -	45	1·3
½ pint milk - - -	20	1·7
¼ lb. eggs - - - -	15	2·0
⅛ „ cheese - - -	20	3·0
	335 grammes.	21·0 grammes.

Hutchison has translated this diet into meals as follows :—

Breakfast : two slices of bread and butter, two eggs.

Dinner : one plateful of potato-soup, a large helping
of meat with some fat, one slice of bread and butter.

Tea : a glass of milk, two slices of bread and butter.

Supper : two slices of bread and butter, 2 oz. of cheese.

The amount of each raw article consumed at these different
meals is calculated from the following data :—

A slice of bread 5 inches long, 3½ inches broad, and ¾ inch
thick, weighs 2½ oz. An ordinary plateful of meat, with bone,
represents 5 oz. of raw and 4 oz. of cooked meat. Six medium
size potatoes equal 1 lb. One egg is taken as equal to 2 oz.
A plateful of potato-soup contains two potatoes. 1 oz. of
butter will cover three or four slices of bread.

In prescribing a diet for a consumptive we must follow the lines indicated by the study of dietetics during health. Unfortunately people suffering from tuberculosis cannot be treated as a class. This is particularly true as regards diet, for many of our patients have contracted the habit of eating little and have to be educated, whilst others are suffering from some disorder of the digestive functions. In prescribing for consumption, therefore, we must, first and foremost, study the individual. If the individual has always been a light eater, or if he has suffered from partial inanition, we should proceed slowly, and gradually accustom the stomach to its extra labour. We should not carry this process of education on too slowly, for we know that our ultimate success depends on increasing the intake of food to somewhat above its normal limits. It our patient is suffering from disordered digestion or high fever, we may have to adopt different measures, as I shall presently show, than we do in the case of a consumptive whose digestion is good and who is able to take exercise. Again, if the individual is suffering from albuminuria, it is a mistake to force him to eat the highly nitrogenous diet which is given to the ordinary case. I have known this mistake lead, in two instances, to fatal uræmia.

For the purpose of this article we may divide consumptives into two broad classes: (1) those who have a sound digestion and who are able to take exercise, and (2) those who are suffering from high fever or any disorder of digestion.

Patients who come under the first heading may be given the ordinary diet of health, together with an extra quantity of fat, and two or three pints of milk daily. If the weight is much below the normal, the total amount of food given should be increased to what it would be if the weight were normal. If the patient's weight is normal, it is a mistake to press unduly the amount of food, as this sometimes leads to a disastrous interference with the physiological balance of the cardio-respiratory functions and body weight. Bardswell and Chapman have shown by scientific experiment that very large diets do not give good results. They have further shown that comparatively large diets are well borne by those who are much below their normal weight, but that they do not give such good results in patients with a normal weight.

These authors hold that a man, one stone under his normal weight of 11 stone, who is capable of taking some exercise, should be given 120—160 grammes of proteid, 140 grammes of fat, and 270 grammes of carbo-hydrates daily.

They divide the food as follows :—

7.30 : Milk, ½ pint.

8.30 : Milk, ½ pint ; bread or toast, 2 oz. ; butter, ½ oz. ; 2 oz. fish or bacon, &c., and an egg.

11.0 : Milk, ½ pint.

Lunch, 1.30 : Milk, ½ pint ; bread, 2 oz. ; butter, ½ oz. ; fish, 2½ oz. ; meat, 3 oz. ; milk puddings, 5 oz.

Dinner : Similar to lunch, but meat 2 oz.

10.30 : Milk, ½ pint.

Cornet, who adopts a somewhat lower fat standard for the diet in health than these authors, is in the habit of prescribing for his patients on the following lines :—

First breakfast, 7 o'clock : ¼ to ½ quart milk (cocoa or coffee), with one or two eggs stirred in, or gruel, or meat, bacon, bread and butter.

The second breakfast, 9 to 9.30 : ¼ to ½ quart milk, or 3 oz. strong wine (sherry, port, marsala), bread and butter.

Noon meal, 1 o'clock : Soup, entrée, fish, roast venison, fowl, with vegetables, preserves and salad, pudding, bread, butter and cheese, 3 oz. red wine, or ½ pint beer.

Afternoon meal, 4 o'clock : ¼ to ½ quart milk (cocoa) with 1 or 2 eggs stirred in, bread and butter (honey).

Supper, 7 o'clock : Roast meat, vegetables, cold meat (ham), roasted potatoes, bread and butter, 3 oz. wine or ¼ to ½ quart beer or milk.

9 o'clock : ¼ to ½ quart milk, 1 swiebach, cakes or bread.

More detailed examples might be given, but it is impossible in this article to go into detail with regard to particular dishes. I must be content with a few general remarks.

Proteids.—It is an established fact that the manufacture and repair of tissue can only be brought about by proteids, acting together with mineral salts and water. Proteids also supply heat to the body. In tuberculosis, proteids are of the first importance owing to the constant loss of tissue. Both fats and carbo-hydrates have the capacity of sparing the proteid portion of our food because they tend, when given in sufficient

quantities, to diminish the proportion of proteid which goes to supply energy, and to increase the proportion which is converted into tissue. Proteids, more especially when given in the form of vegetables, are absorbed less completely than the other constituents of food. In choosing the proteid constituents of the diet especial attention should be paid to the digestibility of the particular food. With regard to meat, there is no particular advantage in what are termed white meats. Beef and mutton should be the chief representatives, but variety is essential when the diet is rather in excess of the patient's appetite.

Carbo-hydrates.—These bodies supply heat ; they also act as proteid-sparers. If 125 grammes of proteid are given in any diet, 62 grammes of the 320 grammes of carbon required daily are supplied. The remainder cannot be supplied entirely by carbo-hydrates. The reason for this is that weight for weight one part of fat supplies two and a half times as many calories as carbo-hydrates. Consequently the bulk of carbo-hydrates required, if given alone, would be so great that digestion would be disturbed. Carbo-hydrates are more completely absorbed than any constituent of food. This is especially true of sugar, less so of vegetable starch. These bodies also increase the deposition of fat. Bread, potatoes, puddings, and sugar by itself, or in the form of honey or jam, are the chief representatives. Rice is absorbed well, and should be given more often than it is. In the case of potatoes it should be remembered that the percentage of carbo-hydrates varies.

Fats.—As we have seen, fats supply heat. They act also as proteid-sparers. Fat is two and a half times a better heat-producer than a carbo-hydrate, but one part of fat· is not so efficient as 2½ parts of carbo-hydrates in sparing the heat-producing qualities of proteid. Therefore, if a large proportion of the carbon required is supplied by fat, the amount of proteid must be increased. Fat is almost completely absorbed, the more completely the lower its melting point. Experiments show that in health ¼ lb. of butter can be absorbed daily without difficulty. Bardswell and Chapman have found that in tuberculosis 96·41 per cent. of an intake of so large a quantity as 231·32 grammes was absorbed. Fat may be given in various ways. Butter is the most digestible form, and is seldom disliked. It is possible, moreover, to use a considerable quantity

of butter in the preparation of sauces and other dishes without attracting the attention of a patient who says he cannot eat fat. Full advantage should be taken of this. Those forms of fish and meat which contain a high percentage of fat, should be given from time to time. Oil may be freely added to salads, but must be of the best quality and not acid. Cream which has about three times the caloric value of milk should not be forgotten. It may be taken in the form of ice-cream. Cod-liver-oil is a useful method of giving fat to hospital patients who cannot afford to buy fat. One hundred grammes supply rather more than 900 calories. The dark variety contains a larger percentage of fatty acid and is perhaps the best.

Vegetables and fruit are valuable additions to the diet for many reasons. They not only supply sufficient bulk of indigestible residue to the food to ensure a healthy action of the intestines, but they render meat more palatable. For this purpose purées, especially of the albuminous legumes, may be given. Brehmer showed that vegetables are important in advanced tuberculosis, as without them patients chew their meat, roll it from side to side, and are unable to swallow it.

Milk is the most perfect food, and in most instances is easily digested. A consumptive should not be given milk as his sole diet, for some five to six quarts are required to meet the normal demands of the body. This large quantity of fluid increases the work of the heart and may lead to dilatation or atony of the stomach. In view of the extra strain which may be thrown on the cardiac muscle, the amount of fluid given should receive more attention than it does. Sometimes milk disturbs digestion. When this occurs the character of the milk should be investigated. If the milk is beyond suspicion it should be given, in such cases, in small quantities at a time, as otherwise it may form an indigestible curd. Sometimes milk is better borne if a proportion of the casein is first extracted. The addition of 5 grains of sodium bicarbonate and 5 grains of sodium chloride to half a pint of milk renders it more digestible. In other cases in which there is a dislike for milk, a variety of flavouring agents may be added with good effect. The tendency towards constipation, which is sometimes set up on this diet, may be met by the addition of seltzer-water, or by alternating the milk with koumiss.

Whatever diet is given, the patient must be made to

thoroughly understand the importance of eating it. The food should be of the highest quality. It is a good practice to analyse particular articles from time to time, for example, the amount of carbo-hydrates in a given sample of potatoes may be determined, or the percentage composition of the milk ascertained. All meals should be cooked and served in the best possible and most appetising way. A point sometimes overlooked is the *necessity for constant variety.* We have to tempt our patients to eat, and it does not stimulate the appetite to know that on a certain day of the week a certain routine collection of dishes will be served. The meals should be given always, even, as Cornet says, pedantically at the same times. In most English sanatoria no food is given between breakfast and dinner, or between dinner and supper. Abroad, frequent meals are sometimes given. Much must depend on individual and national idiosyncrasies, but, other things being equal, it is best for the stomach to have considerable intervals between its hours of work. It is of the greatest possible importance that the stomach should be rested before it is called upon to work. For this reason all consumptives should rest absolutely for halt an hour to one hour before meals. This measure assists digestion and assimilation in a surprising degree, and is one of the most valuable lessons the sanatorium treatment has taught us.

Our best guides as to the suitability of any given diet are the effects it has upon the digestion, the capacity for taking exercise, and the weight. If all these continue satisfactory the diet is good. The weight is a fair guide, but its value should not be over-estimated. Each patient should be weighed under the same conditions at the same hour once a week upon a reliable machine. If weight is lost, more nourishment should be given, and it may be necessary to prescribe less exercise. Once the normal rate is reached we should bear in mind the evil effects of over-fattening, and the amount of food in excess of the normal may be gradually diminished. The easiest way to accomplish this is to diminish little by little the amount of milk and the extra amount of fat.

In the case of patients who are suffering from high fever, anorexia, or disordered digestion, the question of diet may be a more formidable one. It is a mistake to place too much reliance on the patient's own feelings with regard to food. At

the same time personal idiosyncrasies should receive adequate consideration. One of the most interesting features of tuberculosis is the way in which the gastric functions are usually maintained in good working order. Mere anorexia must not be taken as proof that the stomach is incapable of properly digesting the ordinary diet. The appetite is a fallacious guide. In many instances it is the result of habit. It is a remarkable fact that many patients complain that they feel sick, are unable to digest their meals, and have no appetite, when they are fed at frequent intervals and on small quantities of food, but readily lose these symptoms under the stimulus of fresh air, and when ordinary size meals are given at intervals of several hours. It is possible that the explanation of this may lie in the fact that small quantities of food do not stimulate the somewhat debilitated stomach. When the stomach not only has food in it but is to some extent distended by the food, there is a more direct stimulus not only of the muscles but of the glands. Consequently there is a larger secretion of gastric juice, and better muscular movement. The whole digestive process is improved, and the food is assimilated. If we know, by a proper investigation, that the motor and chemical functions of the stomach are normal, we must persuade our patient to eat whatever his appetite or his temperature may be. This is not usually a difficult matter, if the result of not eating is frankly and fairly stated. In most instances, however, such is the frailty of human nature, it is necessary for the physician to personally see, that the patient does eat the food given him until this lesson has been thoroughly learnt. If the anorexia is purely nervous and the patient cannot be persuaded to eat, Debove's method of giving food by means of a tube (which need not be introduced beyond the œsophagus) may be tried. In a certain limited number of cases this method is of considerable service. If the motor and chemical functions are not normal, other methods must be adopted. It is necessary, however, to ascertain definitely the presence of some abnormal condition before making any departure from the ordinary diet. Nutrition is not uncommonly sacrificed for the vague possibility of relief from some distress. It is our duty to see that sufficient food is taken, and that, when possible, solid food is given. On the other hand, it is a great mistake to completely ignore the

condition of the stomach or digestion in tuberculosis. I do not mean that whenever anorexia, vomiting, and other evidences of impaired digestion, such as headache and turbidity of urine, are present, a variety of patent foods and medicines, which are supposed to have some mystic influence on tuberculosis, should be prescribed. The anorexia, atony of the stomach, catarrh, &c. should receive exactly the same treatment as they would do if no tuberculosis were present. For example, proper mastication must be insisted upon; the teeth must receive scrupulous care ; catarrhal inflammation may be met by a mercurial purge, a saline draught and a simpler diet. If atony be marked we should concentrate the diet, avoiding indigestible articles and those of low nutritious value. Thus, milk, rice, and minced lightly cooked meat may be given. Lavage in such conditions is of great value. In other words, we must regard the disordered condition of the stomach as forming a complication of tuberculosis rather than a symptom, and treat it on ordinary lines. It should be remembered, however, in treating tuberculosis, that, whenever we depart from a solid diet, the amount of rest taken by the patient must be largely increased.

Even when considerable fever is present in this disease, the digestive functions are not infrequently unimpaired. Again, Walther has shown that one of the best means of reducing the temperature in cases of active tuberculosis is by means of a suitable quantity of solid food given at the usual intervals. Consequently, whenever it is possible, we should treat our cases of febrile tuberculosis by means of an ordinary diet. In other instances a solid diet cannot be retained. Our aim must then be to supply, in the first place, sufficient nourishment in a suitable form to keep the disease in check, and secondly to place the patient on a solid diet at the earliest possible moment. When it is impossible for such a patient to retain solid food, we often find that alcohol is our sheet anchor.

A study of the metabolic changes in fever shows that the leading characteristic is a great increase in the loss of nitrogen containing tissues. From this fact the conclusion is drawn that a considerable quantity of proteid sparers should be supplied in a diet of fever. As most feverish patients object to fatty foods, we must give an extra quantity of carbo-hydrates for this purpose. Substances containing gelatine, such as calves'

foot jelly, also act as proteid sparers. In cases of febrile tuber-
culosis in which solid food is not retained, milk should be
the staple diet, and at least four pints of it should be given.
These four pints supply only 1700 calories, and therefore it is
necessary to fortify the milk. This can be done usually by
the aid of such preparations as Plasmon or Somatose. The
addition of one or two spoonfuls of milk sugar to each tumbler
full of milk has been insisted upon by Fick. Arrowroot or
cornflower, or many of the patent foods, will supply the
necessary excess of carbo-hydrates. Raw meat is useful, but
preparations, such as beef-tea, although they stimulate the
appetite, should not be regarded as foods. A large number of
preparations may be given, but it is impossible in the space at
my disposal to do more than indicate the principles on which
we should act.

With regard to the intervals at which the food should be
given in these cases, we must be guided largely by the digestive
capabilities of the individual patient. Wherever possible the
food should be given at considerable intervals. If this leads
to disturbances of the digestion, small quantities should be
given every two hours. In any debilitated individuals, or
when there is rapid wasting or insomnia, some warm food
should be given during the night.

. A few words may be said about the administration of
alcohol in tuberculosis. In those cases where the digestion is
good, the temperature is normal, and exercise is possible, there
is no necessity to give alcohol, although small quantities in
many instances are of undoubted benefit. In some instances
small quantities of alcohol will diminish the appetite and retard
digestion, but in most cases it promotes both. Experience has
shown that alcohol is of the greatest possible service when
fever is present. It saves the body proteid, stimulates the
appetite, and, in small doses, hastens gastric digestion. It
facilitates the absorption of fat, and tends to slightly lower the
body temperature. In addition, it stimulates the heart and the
central nervous system, and favourably affects the night-sweats
and the sleeplessness. When solid food cannot be taken,
alcohol, as I have said, is our sheet anchor. Physicians like
Brehmer and Dettweiler, as the outcome of a very large experi-
ence, were in the habit of prescribing alcohol to a considerable

extent. The alcohol should be pure and of the best quality. In afebrile cases, and in some cases where the temperature is raised, red-wine is especially useful. It may be given also with great effect in certain cases of tuberculous diarrhœa. When the digestion is impaired, sound cognac, well diluted, is the best form of alcohol. When vomiting is present, a good dry champagne gives perhaps the best results. Beer and stout are more useful in the afebrile forms of the disease. With regard to the amount of alcohol to be given, this must depend upon the individual case. Nothing but good results from the administration of large quantities when fever is present, so long as the pulse is becoming slower, the appetite better, the skin and tongue moister, and the patient quieter. Careful examination of each individual case will show whether this food is overstepping physiological limits, and so causing pathological effects or intoxication.

THE PARASITES OF SMALL-POX, VACCINIA, AND VARICELLA.

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[With Plate I.]

ON considering the possible causes of failure to demonstrate the causal organisms of these diseases in the menstrua in which they manifestly must be, namely, in the lymphs taken from the pocks of these several diseases, the conception occurred to me that possibly the means adopted for rendering them visible might from the nature of the organisms lead to their destruction, so that on seeking for them in prepared specimens of the lymphs, I found not the organisms themselves, but their débris, the results of their disintegration. On the practical application of this view, namely, by submitting the vesicular contents collected in capillary tubes from the pocks of small-pox, vaccinia, and varicella respectively, to a microscopical examination as hanging-drop preparations, without any other manipulation whatsoever, large numbers of unicellular elements were found, which on a warm stage showed amœboid movements.

Now, these elements could be leucocytes, pus corpuscles, or protozoa. To exclude the leucocytic theory, variolous matter was examined which had been kept for six months in a capillary tube in a sterile condition, the virility of the lymph having been determined by successfully variolating a monkey. The unicellular elements were still present in large numbers. The fact that these elements had survived destruction for six months makes it highly improbable that they were leucocytes, as these latter bodies were found to disappear spontaneously from blood-serum kept in vitro at $37°$ C. after six days, and, after fourteen days, not a vestige of them could be recognised. Furthermore, on attempting to fix the unicellular elements, especially such as were old, they invariably disappeared.

By using absolutely fresh material, however, it was found that these elements could be fixed with equal quantities of rectified spirit and ether, and could then be stained with Löffler's blue. On attempting to *stain* them, it will be seen that the

PLATE I.

Fig. 1. *An encysted parasite from glycerinated calf lymph, showing the reticulated appearance of the cytoplasm.*

Fig. 2. *A parasite from variolous matter, fifth day of eruption, showing several refractile spores.*

nucleus of the element found in variolous matter does not stain at all, while in those from human vaccine lymph it could not be decided whether the nucleus does or does not stain. In varicella lymph one or more nuclei will be found deeply stained, thus affording a means of distinguishing it from the element in variolous matter.

If these elements were pus corpuscles there would be no difficulty in fixing them, and such an assumption would not account for the spontaneous disappearance of the elements from human vaccine lymph, which will again be referred to. In addition, it can be said that the unicellular elements are to be found in vaccine, variolous, and varicella lymphs, when these lymphs are perfectly clear and transparent, and at a stage of the disease when pus is evidently not present. In favour of these elements being protozoa is the discovery that these unicellular bodies could be grown in pure culture on a suitable medium. Of this result more will be said at a future date.

The organism is a spherical body measuring about $\frac{1}{15000}$ of an inch in diameter, which contains a large centrally situated nucleus, which is the most part hidden by small very refractile granules. These granules are considered to be spores, and when extra-cellular are motile, with the exception of those found in glycerinated calf-lymph, in which their motility is inhibited, probably by the glycerine. The cytoplasm of the cell is firmly granular, and often presents a reticulated appearance, probably due to the collection of the spongioplasm in certain areas. The distinction between ectoplasm and endoplasm is only marked when the organism is motile. In order to see these parasites, you must collect the lymph from the vesicles of the several diseases, and put up as hanging-drop preparations variolous matter on the fifth day of the eruption or earlier. Human vaccine lymph must be gathered on the eighth or ninth day of the eruption and examined at once on a warm stage, for the parasites disappear spontaneously on the tenth day of the disease, and cannot be kept in a capillary tube for more than eighteen hours. Glycerinated calf-lymph is best diluted with four or five times its bulk of normal saline solution before examining. The parasite of chicken-pox is found on the first, second, and third days of the eruption, and shares with the parasite of human vaccine lymph the property of extreme motility.

THE OPERATION OF GASTRO-ENTEROSTOMY.

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Historical. — The first idea of forming an anastomosis between two portions of the alimentary tract is due to Gély, who, in 1844, suggested and figured an entero-anastomosis. He was followed shortly after by his countryman, Maisonneuve. The conception of the operation of gastro-enterostomy is due, however, to Nicoladoni ; its performance to Wölfler. On September 28, 1881, Wölfler, in his clinic at Vienna, had performed laparotomy in a case of cancer of the stomach with a view to removing that organ. Finding this impossible, owing to the size of the tumour and its adhesions to neighbouring structures, Wölfler prepared to close the abdomen. Thereupon Nicoladoni suggested to him that it might be possible to re-establish the course of the stomach contents, which had been interrupted by the pyloric stenosis, if an anastomosis were effected between the stomach and intestine. Wölfler successfully followed this advice, and so was born the operation of gastro-enterostomy. Five days later Billroth emulated the example of his pupil, but with less happy results, his patient dying on the tenth day. It was followed in 1882 by cases by Lauenstein, Lücke (of Strasbourg), and Köcher. In 1883 Rydygier published his first case, making the sixth to date. Courvoisier, the same year, devised a new method of performing the operation, which is known to-day as retrocolic gastro-enterostomy. This method is very generally attributed to von Hacker, who, however, was two years after Courvoisier, and only brought this method before the profession in 1885. Unfortunately, Courvoisier did not describe his case as a new method, and left it to be inferred that he had followed Wölfler's method. In 1884 Rydygier published three successful cases. The same year, Socin, of Basle, successfully performed gastro-

enterostomy upon a patient upon whom he had performed a preliminary pylorectomy. In 1884, too, was published the first case in the United States ; that of Ransohoff and Whittaker, which was unsuccessful. In 1885, as above stated, von Hacker perfected the method preconceived by Courvoisier, now known as "posterior gastro-enterostomy." In 1886 Morse published the first case in England. Statistics of all cases up to this time showed 18 operations with 12 deaths, a mortality of 66·6 per cent. In 1887 Novaro performed the first successful gastro-enterostomy in Italy ; followed in 1888 by Giordano and Caponotto. Fritzsch was probably the first to perform gastro-enterostomy for ulcer of the stomach. This he did on November 3, 1887, with recovery of the patient. Heretofore the operation had been undertaken solely for cancer and cicatricial contraction of the pylorus. It was not until 1889 that the operation was performed in France, the first case being that of Pozzi. In 1892 Brenner devised his special method of performing the operation, and Jaboulay introduced a variation under the name of gastro-duodenostomy. In the same year Murphy first used his button in gastro-enterostomy ; and Postnikow introduced the method *en deux temps*. In 1893 Haasler introduced his modification, and Braun the complementary operation of entero-anastomosis to prevent the reflux of intestinal contents into the stomach. The valvular methods of Sonnenburg and of Chaput appeared the same year. Doyen's method and the Villard button appeared in 1895 ; and Poncel's and Souligoux's methods in 1896. The year 1897 was marked by the appearance of Hartmann's modification of Wölfler's operation ; by the valvular methods of Kocher and of Faure ; and more especially by Roux's implantation or Y method. That the Y method did not originate with Roux, however, is proved by its having been practised in jejunostomy by Maydl in 1891, who also advised it theoretically for gastro-enterostomy. Wölfler is also said to have suggested it, without practising it, as early as 1883. The following table modified from Monprofit gives a résumé of the principal methods of performing gastro-enterostomy introduced since Wölfler's first operation in 1881 :—

I.—GASTRO-ENTEROSTOMY BY LATERAL ANASTOMOSIS.

A. Simple anastomosis

1. Jejunum.

Antecolic.

- Simple - *Wölfler* (1881).
- Complex -
  1. Jejunopexy and fixation of the intestine to the stomach: *Lawenstein* (1896).
  2. Anterior colopexy and retrofixation of the meso-colon: *Doyen* (1895).
  3. Posterior colopexy and resection of the meso-colon: *Bazozzi* (1896).

Retrocolic.

- Posterior -
  - Resection of the meso colon (without colopexy): *Poncel* (1896).
  - Superior: *Courvoisier* (1883).
  - Inferior: *von Hacker* (1885).
  - Vertical: *Brenner* (1892).
  - Horizontal: *Haasler* (1893).
- Anterior -
  1. Anterior: *Jaboulay* (1892).
  2. Lateral: *Villard* (1897); *Kocher* (1903).
  3. With pyloroplasty: *Finney* (1902).

2. Duodenum - Gastro-duodenostomy - *Lawenstein*; *Braun-Jaboulay*.

B. Complex gastro-anasto-mosis. Additional primary jejuno-jejunum anastomosis

II.—GASTRO-ENTEROSTOMY BY IMPLANTATION.

A. Double, or epsiliform, or Y.

1. Antecolic - Anterior: *Wölfler* (1883).
   1. Posterior: *Roux* (1897).
   2. Anterior: *Roux* (1897).
2. Retrocolic -
   1. Typical: *Stendel and Moynihan* (1901).
   1. With cholecystenterostomy: *Chlumsky* (1898).

B. Direct and simple -

III.—TRANSFORMATION OF A GASTRO-ENTEROSTOMY BY LATERAL ANASTOMOSIS INTO ONE OF IMPLANTATION BY THE Y METHOD.

A. Original operations

1. Entero-anastomosis and ligature (afferent loop) - 1. *Chaput* (1894) and *Fowler* (1902).
2. Entero-anastomosis and preliminary section. 2. *Luecke* (1899); *Mattoli* (1903).
3. Entero-anastomosis and consecutive section Lateral anastomosis. 3. *Momprofit* (1903).
4. Entero-anastomosis with exclusion - 4. *Gallet* (1898); *Doyen* (1898).
5. *Mattoli* (1903).

B. Secondary operations - [*Momprofit* (1903)]

1. Section above and jejunal implantation below.
2. Section below and jejunal implantation above.

Choice of Operation.—It may be laid down as a surgical axiom that the larger the number of operations devised for any one condition, the more difficult is it to find a perfectly satisfactory one. This would seem to be true of gastro-enterostomy, if we are to judge by the large number of modifications of the general principle underlying the operation. These modifications would seem to have been devised by their various authors for the purpose of overcoming some defect—either real or assumed —in the preceding methods ; or more often in an endeavour to devise some certain way of preventing the *circulus viciosus.*

The operations for forming an anastomosis between the stomach and the intestine include two main divisions, depending upon whether the duodenum or the jejunum is selected. Included under each of these two main divisions there are several operations, differing from each other only in the site and method of performing the anastomosis. Each and every one of these methods has its own particular advocate, depending usually upon the success which has been obtained by the individual with any one operation. Nor do we find a constancy in this advocacy. For after a large experience with one we find surgeons turning to another, and advocating its claims just as strongly as they had done the first. Nor is there ever any likelihood of agreement among surgeons upon the superiority of any one method over another, if we are to judge from the names arrayed against each other. For the purpose of reviewing these operations they may be tabulated as follows, only those being included which are in general and frequent use, or have some claim to possess some distinct advantage in some particular condition.

  I. Gastro-duodenostomy.
      i. Subpyloric (*Jaboulay, Villard, Duranti, Henle*).
      ii. Lateral (*Kocher, Halsted*).
      iii. Combined with pyloroplasty (*Finney*).
  II. Gastro-jejunostomy.
    A. By lateral anastomosis.
        i. Anterior antecolic (*Wölfler*).
        ii. Posterior transmesocolic (*Courvoisier, von Hacker*).
    B. By implantation.
        iii. Posterior Y method (*Roux*).

C. Transformation of A into B.

      iv. Entero-enterostomy between afferent and
          efferent loops (*Braun-Jaboulay*).

      v. Occlusion of afferent loop after entero-
          anastomosis (*Mattoli, Fowler*).

Gastro-duodenostomy.—Reference will only be made to
simple gastro-duodenostomy, *i.e.,* the operation without a
previous pylorectomy or partial-gastrectomy ; nor will reference
be made to Credé's proposal to cut across the duodenum, to
close the pyloric end, and to insert the distal end into the
posterior wall of the stomach. Jaboulay originated in 1892
the idea of performing a gastro-duodenal anastomosis for
pyloric strictures. In 1897 Villard revived the operation in
an improved form under the name of "subpyloric gastro-
duodenostomy." Henle and Duranti published modifications
of this operation. Henle's conclusions were that the occasions
on which the operation can be carried out are not frequent.
Tavel, Krönlein, and de Quervain have all reported successful
cases. Koslowsky (quoted by Kocher) regards the operation
as an ideal one, and predicts for it a wide application. Because
the subpyloric portion of the duodenum cannot be drawn up
and out of the wound, owing to its connection with the gastro-
hepatic omentum and the important structures contained
therein, thus necessitating the suturing being done inside the
abdomen, subpyloric gastro-duodenostomy did not meet with
general acceptance. Kocher, therefore, further modified the
"subpyloric" operation, and by rendering the descending
(second) part of the duodenum, the inferior flexure, and a
considerable portion of the transverse (third) part freely
movable, is thus able to bring the parts to be sutured up into
the wound, to shut off the area of operation by gauze packing
from the general peritoneal cavity, and to do the suturing with
security and comfort. To this operation Kocher gives the
name of "lateral gastro-duodenostomy." He thus expresses
his opinion of it :—

    "To one who has once convinced himself how easily and
securely this lateral gastro-duodenostomy can be performed—
provided the duodenum can be rendered sufficiently movable
—it will be evident how admirably the operation fulfils the
indications for treatment in stenosis of the pylorus. Unlike

the other surgeons who have performed gastro-duodenostomy, we do not limit the operation to special cases ; on the contrary we regard it as the normal procedure, and we are of the opinion that it will take precedence over all the previous methods of gastro-enterostomy and pyloroplasty."

There would seem to be only two contraindications to this operation, viz., the presence of such extensive adhesions to the under surface of the liver, that the duodenum cannot be sufficiently freed, and a dilated and sacculated stomach which is obviously better drained by an inferior gastro-jejunostomy.

Finney has recently devised an operation under the title of "A new method of pyloroplasty," which really combines a pyloroplasty and a gastro-duodenostomy. Although it has met with favour, and is being practised widely in the United States, it does not seem to have attracted in this country the notice that it merits. It is practically a modification of the lateral method of gastro-duodenal anastomosis. The adhesions of the pylorus to neighbouring structures are freed, as also are the pyloric end of the stomach and the first portion of the duodenum. Upon the thoroughness with which this step is done depends the success of the operation, as it does in the one previously described : "A suture, to be used as a retractor, is taken in the upper wall of the pylorus, which is then retracted upwards. A second suture is then inserted into the anterior wall of the stomach, and a third into the anterior wall of the duodenum at equidistant points, say about 12 cm., from the suture just described in the pylorus. The second sutures mark the lower ends of the gastric and duodenal incisions respectively. They should be placed as low as possible in order that the new pylorus may be amply large. Traction is then made upwards on the pyloric suture and downwards in the same plane, on the gastric and duodenal sutures. This keeps the stomach and duodenal walls taut, and allows the placing of the sutures with greater facility than if the walls remained lax. The peritoneal surfaces of the duodenum and stomach, along its greater curvature, are then sutured together as far posteriorly as possible. A continuous suture is used for this, as being more easily and quickly inserted, and can be reinforced after the stomach and duodenum have been incised. After the posterior line of sutures has been

placed, an anterior row of mattress sutures is taken, which are not tied but left long. These sutures, after they have been placed, are retracted vertically in either direction from the middle of the portion included in the row of sutures. When these sutures have been retracted, the incision is made in the shape of a horseshoe. The gastric arm of the incision is made through the stomach wall just inside the lowest point of the line of sutures, and is carried up to and through the pylorus and around into the duodenum down to the corresponding point on the duodenal side. A continuous catgut suture is now taken through and through all the coats of the intestine on the posterior side of the incision. This reinforces the posterior line of sutures, secures better approximation of the cut edges of the mucous membrane, and prevents the reunion of the divided intestinal walls. The anterior sutures are then straightened out and tied and the operation is complete, unless one wishes to reinforce the mattress sutures with a few Lembert stitches." Finney recommends that as much as possible of the scar tissue upon either side of the incision should be excised in order to limit the after-contraction of the cicatrix. The redundant edges of mucous membrane are also trimmed off to prevent the formation of a valve-like fold at the new pylorus. Neither adhesions, however firm or extensive, to the abdominal wall, liver, gall bladder, colon, and omentum, nor dilatation of the stomach, is a contraindication ·to this operation. In the latter case the lower limit of the new opening is at or near the level of the most dependent part. If the dilatation is of great degree, a gastropexy or gastroplication may be also done.

Finney's operation differs from and has marked advantages over lateral gastro-duodenostomy in that, while in the latter the opening is placed as high up as possible and is not large in size, in the former the size of the opening is limited only by the mobility of the stomach and duodenum, and the judgment of the operator. With the possible exception of active ulceration, all the objections that have been urged against the usual operations of pyloroplasty are met and overcome by Finney's operation.

Gastro-jejunostomy.—The two forms of this operation, by lateral anastomosis, the anterior antecolic or Wölfler's operation, and the posterior transmesocolic, usually known as von

Hacker's operation, are too well known to need description. Both have their advocates among distinguished surgeons, and without doubt both have their own indications and contra-indications. And in both operations, of the various methods used to make the junction between bowel and stomach, whether by simple suture, decalcified bone bobbin, metal button, or ligature, each has its followers. Certainly the tendency to return to simple suture has been increasingly more marked of late, and for efficiency nothing compares with it. It possesses the advantage of universal applicability to all conditions, and the difficulties in its use are becoming less with improved technique. Still, great value attaches to various artificial aids to anastomosis, more particularly in shortening the time of operation, and in simplifying the operation for those who are not proficient in simple suture of the intestine. It is questionable, however, whether suture over a decalcified bone bobbin can be performed in a shorter time than by simple suture. It has the advantage—probably theoretical—that the lumen of the anastomotic opening is kept widely open as soon as inserted. While with metal buttons the anastomosis can be made in the minimum length of time with the smallest amount of suture, yet there are one or two unsurmountable objections to their use. They are unabsorbable, and are apt to be retained in the stomach, causing possible ulceration or even blocking the anastomotic opening; or may fall back into the afferent or duodenal loop of bowel, causing ulceration and even perforation. Again, there is no guarantee of their mechanical perfectness. W. J. Mayo finds that on an average nearly 20 per cent. of buttons are of imperfect workmanship and dangerous. So that one is inclined to agree with Codivilla, who, in speaking of the use of the Murphy button in gastro-enterostomy, said : " Its good function is always in God's hands." A disadvantage in gastro-enterostomy possessed by all mechanical appliances is that the opening is relatively small to the size of the button.

McGraw, in 1891, presented to the American Medical Association the results of his 24 experiments on dogs in which gastro-jejunostomy had been done by means of an elastic ligature. This was a revival of the successful results obtained in the same way by Bardenheuer in 1888, who possibly got the

idea from Gaston, who in 1884 had used the elastic ligature to
make an anastomosis between the gall-bladder and duodenum.
Similar experiments have been performed and published by
Cordier, Podrez, Modlinski, Cutts, Kakels, and Maury. Murphy,
from the surgical laboratory of Harvard Medical School, has
recently reported the results of his experiments with the elastic
ligature, and concludes therefrom " that in cases in which an
immediate opening of the bowel is not imperative, and in
which the avoidance of operative shock is an important factor,
the elastic ligature may prove to be the operation of choice
in gastro-enterostomy and lateral anastomosis." Several cases
have been successfully done by means of the elastic ligature,
and Meyer, in reporting two of them, says that he finds this
method " extremely simple, time-saving, and very satisfactory,"
and that he expected to continue to employ it in his future
cases.   There are one or two advantages in this method,
viz., the parts of the gut to which the ligature is applied do not
slough, but become absorbed, and after four or five days there
is perfect union ; and any sized opening can be made.

Concerning the choice of the anterior or posterior operation,
apart from the individual preference of the particular surgeon,
there are certain conditions which determine the selection. A
growth involving a large part of the posterior wall of the
stomach, firm adhesions of the posterior wall to surrounding
structures, a dilated and overdistended stomach which cannot
be easily drawn out and turned up, and a short and narrow
transverse mesocolon, all necessitate the anterior operation
being done. Another point in favour of the anterior has been
mentioned by Kocher, viz., that as the place of opening in the
transverse mesocolon is decided by the position of the blood-
vessels, so the position of the stomach opening depends on the
condition of the mesocolon, and one is not always able, as in
the anterior operation, to choose a spot which best fulfils the
conditions. Again, the greater the amount of damage done to
peritoneal folds the greater will be the adhesions, which are the
cause, according to many surgeons, of the "vicious circle."
This damage is not a necessity of the anterior operation. It
has been claimed that the stomach is better emptied by the
posterior operation, but this does not hold if the opening in the
anterior operation is placed at the lower border of the empty

stomach, and that part selected which reaches farthest down or can be drawn farthest downwards. This point has been emphasised by Kocher, who calls the operation " gastro-enterostomosis antecolica inferior." On the other hand, Peterssen says that, contrasted with the anterior operation, posterior gastro-enterostomy is always the easier the greater the gastric dilatation, and if the incision be large, it can be performed extraperitoneally. And that the ultimate gain from the functional standpoint in posterior gastro-enterostomy far outweighs the advantage of anterior gastro-enterostomy, which from functional efficiency must be combined with enteroenterostomy.

The posterior γ method (Fig. 1) originated theoretically with Wölfler, though it is chiefly due to Roux that it has been
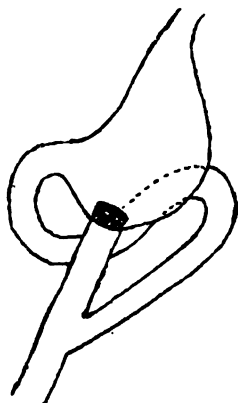
Fig. 1.

brought into prominence and usually goes by his name. It forms the type or basis of those operations which have been designed to prevent the " vicious circle." It has its special indication in those cases where there is a danger of decomposition of the stomach contents, or where decomposition is already present, as in ulcerating growths, or in cases of great atony of the stomach. The essential result is that the stomach should be rapidly emptied and kept empty, and this is best obtained by Roux's operation. However, regurgitation into the stomach does take place after Roux's operation, and this occurs especially in those cases where the shortness of the

mesentery prevents the proximal end of the cut jejunum being
implanted into the descending loop far enough away from
the stomach. But the great objection to Roux's method is
the necessity of performing a double anastomosis, thus pro-
longing the time of operation. Once the jejunum has been
divided, the operation must be proceeded with to the end,
regardless of the patient's condition, which in the majority
of cases is far from good to begin with. This is the chief
reason why this operation producing such perfect functional
results is not more frequently performed, and why so many
attempts have been made to modify the simpler von Hacker's
operation (Fig. 2) into one resembling the Y method in its
anatomical arrangement and equalling it in its ultimate results.

The Braun-Jaboulay modification (Fig. 3) was one of the
first to be introduced. In this an entero-anastomosis is made
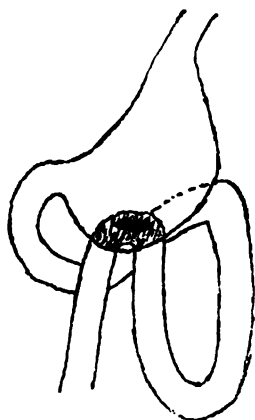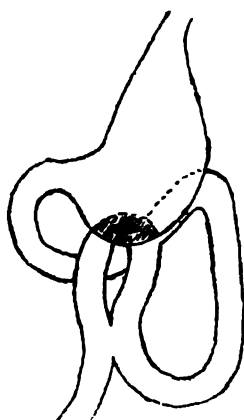
Fig. 2.   Fig. 3.

between the afferent and efferent loops of the jejunum affixed
to the stomach in a von Hacker's operation. It has been
found, however, that this does not prevent the entrance of the
intestinal contents into the stomach, with the formation of a
vicious circle. This operation is therefore no improvement
upon the von Hacker, and is inferior to Roux's.

Mattoli has added another modification to the modified
operation of Braun-Jaboulay, and claims that the vicious circle
is absolutely prevented thereby. This consists in closing with
sutures the afferent branch of the jejunum between the two

anastomoses (Fig. 4). This is done by grasping the piece of intestine in such a way as to groove it, the two resulting ridges
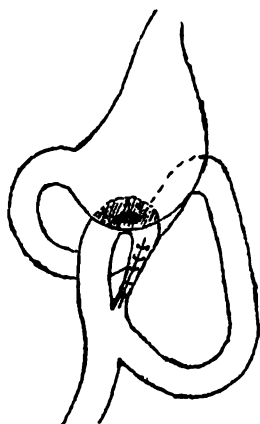
Fig. 4.

being then sewn together by a continuous suture, thus converting this section of the intestinal tube into a solid cord. Doyen had previously eliminated this afferent loop between the two points of anastomosis by dividing it, or, if too long, by resecting it, and then closing the two cut ends, thus leaving two blind pouches. This operation is open, however, to the objection that considerable time is consumed in closing properly the divided or resected ends of the afferent loop. Luecke further modified Doyen's operation by dividing the jejunum first, before effecting the gastro- and entero-anastomosis, and suturing the ends. He then makes a lateral anastomosis between the stomach and efferent loop, finally, a lateral entero-anastomosis between the afferent and efferent loops, each with coincident peristaltic direction. By this method, the contents of the stomach and those of the afferent loop are moved in the same direction. The same objection can be urged against Luecke's operation as against Roux's, viz., that the time occupied in its performance renders it unsuitable for the majority of cases, and that once commenced it must be gone on with to the end. Fowler has brought forward the same modification as Mattoli, with a difference in the method of occluding the afferent loop between the two anastomoses. He passes a No. 20 silver wire two or three times around the afferent loop at a selected point,

and draws upon the turns sufficiently to occlude the lumen without strangulating the wall of the intestine. The ends are twisted together, cut short, and coiled up in such a way as to prevent subsequent injury to surrounding structures.

All these modifications of von Hacker's operation have this advantage in their performance over Roux's operation, viz., the surgeon can stop at any step in the operation if the patient's condition demands it. He is not compelled to follow it to the end as he is in Roux's method. Kocher has added one or two modifications to the original Wölfler operation of anterior gastro-jejunostomy. He applies the loop of the jejunum to the stomach vertically so that the proximal limb ascends posteriorly, and the distal limb descends anteriorly. The sutures are applied *transversely* to the long axis of the intestine. Before introducing the sutures, a transverse fold is made in the proximal limb, thus forming a spur or valve, for the purpose of guiding the gastric contents into the lower limb of the jejunum, and also of preventing a reflux of the duodenal contents into the stomach. Two objections have been urged against Kocher's modification, viz., that it does not prevent overfilling of the duodenum and consequent inhibition of the contractions of the stomach; and that the valve, however efficient at first, soon ceases to functionate on account of the contraction of the tissues forming the spur.

Sykow, of Moscow, has followed a similar plan of making an intra-intestinal valve. His valve is made after the completion of the suturing of intestine to stomach by a transverse opening in the intestine, through which he effects the gastro-intestinal anastomosis, and which he sutures up again in an overlapping manner to form a spur directed towards the lumen of the intestine. It is inferior to Kocher's method and open to the same objections.

Faure's method of performing gastro-enterstomy by invaginating the stomach through a button-hole shaped opening in the intestine, and forming a valve by turning the opening in the invagination towards the afferent limb of the intestinal loop, is open to a number of similar objections.

Witzel has combined gastro-jejunostomy with gastrostomy, and terms the operation " gastro-enterostomosis externa." A soft rubber catheter of large size is buried in the stomach wall,

after his method of gastrostomy. Then, before closing the anterior part of the gastro-enterostomy opening, the lower end of the tube is pushed down into the efferent limb of the jejunum for 10 cm., where it is secured in place by suturing it to the mucous membrane of the intestine. The operation is then completed and the patient fed at once through the tube. Hammesfahr, following Rutkowsky, advocates a similar method in pyloric stenosis, and reports 12 successful cases. The tube is removed in three weeks, and it is stated the gastric fistula very soon closes.

BIBLIOGRAPHY.

Bardenheuer : *Exp. Beiträge z. Abd. Chir.*, Vol. XVI., 1888
Cordier : *Jour. Amer. Med. Assoc.*, Vol. XVII., 1891.
Cutts : *N. W. Lancet*, Vol. XXI., 1901.
Deaver : *Amer. Jour. Med. Scs.*, CXXVII., 1904.
Finney : *Johns Hopkins Bull*, 1902.
Dubard : *Bull. méd.*, Paris, XVIII., 1904.
Fowler : *Ann. Surg.*, 1902.
Gaston : *Atlanta Med. and Surg. Jour.*, Vol. I., 1884 ; Vol. II., 1885-6.
Gauthier : *Lyon méd*, CI., 1903.
Hammesfahr : *Centralb. f. Chir.*, 1903. (Eplt., *B.M.J.*)
Henle : *Centralb. f. Chir.*, November, 1898.
Jaboulay : *Prov. Med.*, Lyon. Vol. VIII., 1894.
Kakels : *Med. Rec.*, Vol. LXII., 1903.
Kocher : *Centralb f. Chir.*, January, 1903.
Mikulicz : *Archiv. f. klin. Chir.*, Vol. XXVII.
Murphy : *Boston Med. and Surg. Jour.*, Vol. CL., 1904.
McGraw : *Jour. Amer. Med. Assoc.*, Vol. XVI., 1891
Maury : *Med. News*, Vol. LXXXIII., 1903.
Modlinski : *Verhandl. d. Deut. Gesselb. f. Chir.*, 1899.
Monprofit : *Gaz. méd de Par.*, IV., 1904.
Musser and Keen : *Jour. Amer. Med. Assoc.*, XLII., 1904.
Mayo : *Ann. Surg.*, 1902.
Podrez : *Archiv. f. klin. Chir.*, LVII., 1898.
Petersen : *Beiträge z. klin. Chir.*, Band XXIX.
Quénu : *Bull. et mém. soc. de chir.*, Paris, XXX., 1904.
Riche :   ,,   ,,   ,,   ,,   ,,
Richard : ,,   ,,   ,,   ,,   ,,
Rolgans ; *Wien, klin. Rund.*, XVII,, 1904.
Savini : *Med. News*, N.Y., LXXXIV., 1904.
Terrier et Hartmann : *Chirurgie de l'estomac*, Paris, 1898.

ANÆSTHESIA IN OPERATIONS ON THE UPPER AIR PASSAGES.

A.—FROM THE OPERATOR'S POINT OF VIEW.

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IMPORTANCE OF THE SUBJECT.

IN no region of the body is the operator so continuously concerned in the safe administration of a general anæsthetic as he is when the nose, pharynx, larynx, or trachea are concerned. In other parts the surgeon can generally leave the anæsthesia entirely to the responsibility of the administrator, although their co-operation is required when such matters as the duration of the operation, shock, hæmorrhage, and so forth call for consideration. It is otherwise when the upper air tract is the site of operation. Here the thoroughfares for the passage of food and air cross one another, and in such a narrow space as the isthmus of the fauces we may have, in an unconscious patient, to provide for respiration, swallowing, vomiting, coughing, the administration of the anæsthetic, the surgeon's fingers and instruments, and the anæsthetist's gag and other apparatus.

The patient in fact must breathe, cough, swallow, vomit, bleed, be anæsthetised and be operated on through one restricted passage, possibly further encroached on by disease.

Another difficulty is that the administration of the anæsthetic can seldom be pushed so far as to abolish the swallowing or coughing reflexes,—the latter, fortunately, is one of the last to go,—and the anæsthetic must in many cases be frequently interrupted to allow of some manipulation by the operator. As the steps of an operation may thus have to be taken in irregular periods of time, the surgeon must so far make his progress contingent on the anæsthesia, which he has to watch cautiously, taking care that his movements do not impede respiration or lead to sudden deepening of anæsthesia, and are

arrested in time to allow the anæsthetist to renew the adminis-tration before the patient recovers too far.

In this restricted field of operation it is also frequently impossible for an assistant to give any help, and his place has to be filled by the anæsthetist who may be called upon to manipulate the gag, and probably control the tongue, while to him may fall the duty of sponging away blood and mucus, flexing or extending the head, pressing in the pharynx from the outside (as in tonsillotomy), keeping the chin in the exact mid-line for tracheotomy, rotating the patient to one side, or protecting the eyes from any overflow from the nose of blood charged with chloroform, peroxide of hydrogen, cocaine, or other drugs.

In fact, the operator has to keep a constant watchfulness on the administration of the anæsthesia, while the chloroformist must in addition to his ordinary duties perform those of a skilled laryngological assistant. They must work in frank and complete accord. But I think, as the final responsibility rests with the operator, he should not be thought exacting if he stipulates for an anæsthetist with whom he is used to co-operate, one who has had some special training in this particular field of anæsthesia.

At the same time, the anæsthetist cannot be expected to perform his functions in throat cases with the same regularity and smoothness that he does in, say, an amputation of a lower limb. Besides, laryngologists have their individual views as to the nature of the anæsthetic used, and the depth of uncon-sciousness desirable, while they often differ in the operative procedures by which they arrive at a common result.

DIVISION OF THE SUBJECT.

We may now consider the most suitable anæsthetics and their mode of administration, the difficulties and dangers to be encountered, and the methods of avoiding or overcoming them.

CHOICE OF ANÆSTHETIC.

There are some short manipulations in laryngology—boring a maxillary antrum from a tooth socket, removing a limited spur from the septum, &c.—in which the administration of

nitrous oxide gas or chloride of ethyl is sufficient. The removal
of adenoids in anyone above 16, owing to the comparatively
larger capacity of the pharynx over that age, is generally
satisfactorily completed under one of these more evanescent
anæsthetics. The operation for adenoids or tonsils in children
will be considered later. For longer operations the majority of
laryngologists are united in their preference for chloroform—or
one of the mixtures of chloroform, ether and alcohol—over
ether. The increased vascularity induced, the greater respira-
tory disturbances, and its irritant action in the air passages,
have militated against the use of ether in operations on the
air passages, although some general surgeons maintain their
preference for it under all conditions.

THE DANGERS.

In most cases the anxieties attending anæsthesia in opera-
tions of the upper air passages arise more from the methods of
administration, or neglect of contingent difficulties, than from
the use of any particular drug. As already noted, the swallow-
ing and coughing reflexes are amongst the last to be obliterated,
and they never should be abolished if the glottis is unprotected
from invasion. On the other hand, an anæsthesia so light that
the patient is not passive, is not free from danger. Convulsive
movements increase vascularity, interfere with the operation
and so add further risks, while spasms and reflex irritations are
increased. Not only is respiration apt to be directly interfered
with, but reflex inhibition of respiration is particularly likely to
arise through the sensitive trigeminal from any traumatism of
the nose or post-nasal space, or through the superior laryngeal
when the larynx is concerned. The invasion of the larynx by
blood is one of the chief dangers—a greatly increased one if the
anæsthesia is the least too deep. Besides blood there is the
risk of vomited matter, detached tissue loose teeth, or a broken
piece of instrument interfering with respiration.

AVOIDANCE OF DANGERS.

The risks are undoubtedly increased by anything which
disturbs the even and progressive onset of anæsthesia. Thus,
the custom of chloroforming a child in its bed and carrying it
into an adjoining operating room is to be deprecated. Vomiting

—frequently preceded by pallor and feeble pulse—adds so much to the dangers of anæsthesia in throat operations that its onset should be carefully anticipated, and its occurrence guarded against by carefully preparing the patient beforehand. The fear and sense of suffocation caused by too intense a dose of vapour appears to be as harmful as too feeble a dose, or too slow administration. It has been my fate to wait as much as 40 minutes while a practitioner has timorously administered chloroform for the adenoid operation, though at the end of that time the anæsthesia was so light that it was doubtful whether the child was not more sleepy than anæsthetised !

From the surgeon's point of view all risks are diminished if he can operate swiftly and thoroughly. Excisions of vascular growths like adenoids and tonsils should be made with sharp tools and as completely as possible. In many operations it is wiser to push on and finish the operation—when bleeding will often stop spontaneously—instead of stopping to sponge or attempt to arrest it.

The direct risks to the circulation and respiration are present as in other operations, and are dealt with by Dr. Dudley Buxton. Both these risks are increased in operations on the air-passages ; to the heart by the reflex effects transmitted by the vagus from its branches in the throat ; and to breathing not only by direct poisoning of the respiratory centre, but also by reflex action, by the risk of inspiring blood, vomited matter, or detached tissue into the larynx, or trachea, or by direct obstruction by surgeon's hands, instruments, or the crowding backwards of the tongue.

The surgeon can assist in the mitigation of these risks in many ways. Broadly speaking his aim will be to maintain the patient in the most favourable position to meet these risks, while he operates as bloodlessly and speedily as possible, keeping careful watch on the air-way remaining unobstructed. In operations on the nasal cavities the additional local use of cocaine not only facilitates the operation, but appears to have the useful effect of diminishing reflex irritation. By the addition of adrenalin its depressing vaso-motor effect is avoided.

Position.—The two most favourable positions are (*a*) the sitting posture, with the body erect, and (*b*) the horizontal

position. The former has a great advantage to the operator
in that it is the one in which he is used to examine his
patients, and he is instinctively at home with all the ana-
tomical landmarks. In short operations—the drilling of the
maxillary antrum from a tooth socket, removal of tonsils
or adenoids under nitrous oxide—the operation is completed
before any hæmorrhage starts, and as the head can be quickly
tilted forwards, it escapes readily from the nose or mouth.
This position is also used in much more prolonged operations,
as the removal of multiple laryngeal papillomata in children.
The anæsthetic—with possibly the addition of local application
of a weak cocaine solution—is given while the child is sat
up in a nurse's lap. One assistant steadies the head from
behind while another holds the tongue out of the mouth.
Frequent sponging away of mucus is necessary, but otherwise
the position so closely resembles that for the removal of
laryngeal growths in adults, that it is very acceptable to the
operator.

The horizontal position lessens the chances of syncope,
but—until he becomes used to it—it somewhat disconcerts
the relationship of surgical landmarks, while there is the
constant tendency for the tongue, blood, mucus, &c., to
gravitate towards the entrance of the larynx.

These disadvantages can be counteracted in various ways.
With many, a favourite method is to place the head in the
" hanging position " of Rose, *i.e.*, with the chin extended on
the neck and the head lying well over the end of the table.
It is claimed that in this position all blood and mucus can
safely make its exit through the nose and mouth, and that
the risk of asphyxia is abolished. Personally, I am unable
to support these views. I find that congestion is more marked,
with increased outpouring of blood and mucus ; inspiration of
foreign matter is not prevented; unconscious swallowing appears
more difficult ; blood collects in the roof of the mouth and
the naso-pharynx, from which it is more difficult to expel it ;
and the risk of the tongue falling backwards over the larynx
is immensely increased. The greatest objection is that the
entrance from the pharynx to the naso-pharynx becomes
narrowed in this position, and the operator is also unable to
rotate the patient rapidly into the lateral horizontal or lateral

prone position—should necessity arise. A promising modification of this position is that in which the chin is not over-extended, but the occiput projects beyond the end of the table, being supported on a lower plane by an assistant or by a suitable head rest (Fig. 1). Some operators[1] are strongly in
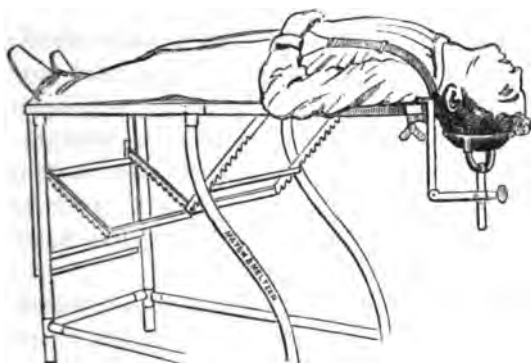
Fig. 1. *Head-rest for post-nasal and other operations, designed by Dr. F. A. Nyulasy, of Melbourne* (Brit. Med. Jour., *April* 30, 1904). *It can be clamped on to the end of an ordinary table, and the " rest " itself may be quickly raised or lowered.*

favour of the Trendelenburg position, claiming that in operations on the naso-pharynx the adenoid growths can be seen as plainly as the nose on a man's face. I have no experience of it, and my own predilection is for the supine horizontal position. In the commonest operations—those for tonsils and adenoids—the patient's head may rest on a pillow until anæsthesia has reached a suitable stage (*i.e.*, until the conjunctival reflex, but not the swallowing reflex, is abolished). The pillow is then withdrawn and the occiput rests directly on the table or on a folded towel. The anæsthetist opens the mouth with his gag, and the operator, standing on the patient's right hand, illuminates the pharynx and introduces his forefinger into the post-nasal space to determine the presence, character, size and situation of the growth. This manœuvre is also of value for two other reasons : it will at once arouse a child who is not sufficiently unconscious, and so show the necessity of a deeper

[1] W. W. Keen : *Annals of Surgery*, July, 1897.

anæsthesia, while it may excite a reflex cessation of respiration. If the latter occurs, a pause of a few seconds, or a sharp drawing forwards of the chin, will suffice to see breathing re-established.

The 'major portion of the growth is then swept away at the first stroke, and before any gush of blood occurs the patient is rolled *en bloc* over to his right side. In this position the patient is free from danger from the hæmorrhage, for the blood pours freely from his nose and along the right side of the mouth ; while the operator, especially if provided with an electric frontal search light, can curette any lateral remains of adenoid tissue, and guillotine both tonsils. In this last step he has the co-operation of the anæsthetist (the most skilled assistant would only be in the way), in pressing in the tonsils from the angle of the jaw.

If no preliminary digital examination is required, the curette should be introduced behind the palate, but no cutting movement imparted to it until it is seen that respiration is going on naturally. Owing to neglect of this, alarm is often caused. The presence of the instrument induces cessation of respiration : the operator fails to notice the fact and curettes the growth : there is a gush of blood—increased by the cessation of the respirating act—and with the next deep inflation of the lungs this tends to be inspired into the trachea.

For operations where bleeding into the pharynx can be prevented—to be described presently—the supine horizontal posture, with the head more or less raised, is the most suitable for the operator as it is for the anæsthetist.

The prevention of hæmorrhage into the pharynx plays an important part in the question of anæsthesia of the upper air passages. In operations on the frontal or maxillary sinus, or on the ethmoid from the outside, this can generally be effected by first applying cocaine and adrenalin to the nasal chamber of the affected side, and then packing the choana from the front by one or two strips of sterilised ribbon gauze, 1 inch wide. Operations on the septum can nowadays be rendered so bloodless by the use of adrenalin, that it often suffices to tuck a piece of dry gauze just beyond the site of operation so as to collect the few drops which run backwards. In curetting the ethmoid labyrinth from the inside it is often useful for the

operator to have his left forefinger introduced through the mouth and passed up behind the soft palate into the choana. This serves him as a useful anatomical landmark, and if the patient is well rotated over to the left side (where the surgeon should take his stand) the finger tip also serves to plug the choana and to prevent blood passing backwards. In more bloody proceedings, such as removal of malignant growths, a post-nasal sponge should be inserted. A thoroughly purified Turkey sponge, the size of a small orange, is squeezed dry and tied in the middle with a narrow tape. The soft palate is held forward by a palate hook, or the operator's left forefinger, while the sponge can be easily tucked firmly into the post-nasal space.

In the radical operation on the maxillary sinus through the canine fossa, in addition to the post-nasal plug, bleeding into the throat is further prevented by a cheek-sponge inserted between the molar teeth on the same side.

Operations on the post-nasal space, apart from that for adenoids, and on the pharynx are sometimes apt to be accompanied by such alarming hæmorrhage, require such complete anæsthesia, such freedom of manipulation to the operator, that it is of the greatest importance for anæsthesia to be carried on uninterruptedly and without complications from hæmorrhage. This is most effectually done by the simple operation of making an opening through the crico-thyroid membrane, and inserting a laryngotomy tube (Fig. 2). Sponges can then be firmly

Fig. 2. *Laryngotomy Tube.*

packed into the lower pharynx, entirely occluding access to the larynx, while the anæsthetic is administered continuously through the laryngotomy tube. This latter can generally be

removed at once on the conclusion of the major operation. It has been suggested that the larynx might be occluded by an intubation tube, through which a rubber tubing and cannula would convey the anæsthetic into the trachea while preventing any access of blood. The suggestion is more ingenious than practical. Apart from the effect on the larynx, the tube for the anæsthetic would have to pass through the mouth or nose, and would therefore be still in the operator's way—which it is not when attached to a laryngotomy tube.

Thyrotomy is an operation which may be required in various affections,[1] though its chief usefulness is in early intrinsic malignant disease of the larynx.

Figs. 3 and 4. Hahn's *Tracheotomy Tube and Funnel for administering Chloroform through it.*

The operation is rendered feasible by the satisfactory way in which we are now able to provide for anæsthesia and at the

[1] Semon: *Lancet,* August 11, 1900; Uruñuela: *Annales des mal. de l'Oreille,* 1900, No. 9, p. 261.

same time protect against hæmorrhage into the lungs. The anæsthetic is first administered through the nose and mouth : a median tracheotomy is performed, and a Hahn's tube inserted, through this tube the chloroform vapour is given from an inhaler or pumped by a Junker apparatus during the rest of the operation (Figs. 3 and 4). When the sponge surrounding the Hahn's tube has had sufficient time to become moistened and expanded, the thyroid cartilage is split in the centre and then held apart. If a weak solution of cocaine is applied to the interior of the exposed larynx it checks reflex coughing, and permits of a sponge being tucked down into the lower part of the larynx—inside the cricoid and above the Hahn's tube. The lower air passages are thus doubly protected from the invasion of blood, while the administration of the anæsthesia is in no way interfered with during the rest of the operation.

The removal of adenoids is an operation which is performed more frequently than any other single operation, and therefore deserves some special consideration as to the most suitable anæsthetic.

W. G. Holloway (*Medical Magazine,* 1896, Vol. V., p. 598) tabulated 14 deaths under chloroform in nose and throat operations reported up to April, 1895. Of these 11 were in operations on tonsils and adenoids, and had been reported within a space of three years. To this catalogue F. W. Hinkel,[1] in 1898, added 7 other fatalities (one of them personal).

In some cases death has taken place before the operation was commenced.[2] In others, alarming symptoms only set in after the operation had been completed,[3] and as much as 7 or 8 minutes have elapsed between the cessation of chloroform and the onset of dangerous symptoms.

I have personal knowledge of several other fatalities which have never been reported, so that we are justified in inferring that the mortality is still greater than statistics show. Chloroform is generally regarded as the safest anæsthetic for children, and as the above facts show that sudden death may occur before the operation is commenced or after it has been

[1] *Trans. Amer. Laryngol. Assoc.,* 20th Meeting, 1898, p. 80.
[2] *Brit. Med. Journ.,* 1895, Vol. I., p. 949, and *Brit. Med. Journ.,* February 27, 1897.
[3] J. F. Barnhill : *Amer. Med. Assoc., Section of Laryngology,* 1898, p. 38.

successfully completed, it would appear that it may not be the operation, but something in the condition of patients with adenoids and tonsils which increases the toxic action of chloroform. This "something" has been thought to be a state to which the term *Habitus lymphaticus* has been given, for in a number of cases of sudden death from slight causes postmortem examination has revealed a noticeable hypertrophy of the lymphoid tissue throughout the body, and particularly of Waldeyer's ring. The thymus gland in these cases was persistent, and often very large, and the lymph follicles in the intestine were decidedly hypertrophied. Moreover, these subjects frequently presented a dilated heart, and at times a narrow aorta.[1] It must also be remembered that alarming collapse may occur during this operation even when no anæsthetic is used.[2]

The subject requires investigation, and although I must have performed some thousands of adenoid operations under chloroform without any fatality and with very few alarming symptoms, I can never regard the anæsthesia for this operation from chloroform as free from risk, although in the hands of anyone with experience and a full realisation of possibilities this risk is reduced to a very slight one.

Many surgeons prefer the use of nitrous oxide anæsthesia, the patient sitting up as for a dental operation, or in a horizontal position. The 45 seconds available are generally sufficient for any skilled operator to remove both adenoids and tonsils ; but for those who are not kept dexterous by almost daily exercise it is quite inadequate, while any jactitation interferes with smooth execution, and the quick return to consciousness prevents a thorough inspection of the throat. To small children the facepiece of the apparatus is also alarming.

Latterly the use of chloride of ethyl for this operation has become very general in France [3] and is making rapid progress in this country. Anæsthesia is induced rapidly and is complete, the period of unconsciousness is longer than with nitrous oxide,

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[1] Paltauf: *Medical News*, August 7, 1897 (quoted by Hinkel); Kolisko: Foster's *Therapeutics*, Vol. I., p. 398 (quoted by Hinkel); Picqué: *Société de chir. de Paris*, N.S., Vol. XXI., 1895; D'Este Emery: *British Journal of Children's Diseases*, 1904.

[2] Holger Mygind: *Monats. für Ohrenheilk.* Juni, 1902.

[3] A. Malherbe: *Bulletin de Laryngologie*, Tome V., 1902, p. 189.

and the recovery is equally rapid. A second administration can follow, if required.

Adrenalin has done much to diminish the amount of hæmorrhage in smaller operations on the nose, especially on the septum, but it is useless in the removal of adenoids or tonsils, or of other large growths.

Local anæsthesia avoids the use of a general anæsthetic in many conditions. Operations on spurs and deviations of the septum, removal of turbinal hypertrophies, of nasal polypi, of benign growths in the nose, pharynx, or larynx, &c. are commonly carried out under cocaine. The risk attending a general anæsthetic in stenosis of the larynx or trachea can also be avoided by the Schleich method of endermic anæsthesia. Goitres accompanied by compression of the trachea are frequently removed under local anæsthesia, and tracheotomy in many cases can be both painlessly and bloodlessly performed after a preliminary endermic injection of cocaine and adrenalin.

The direct inspection and treatment of affections of the œsophagus, trachea, and bronchi is nowadays rendered possible by the use of Killian's tubes. In some cases these can be passed down the gullet or into the trachea with the local anaesthesia of cocaine. If necessary, a general anæsthetic can be given, and the instruments are then most successfully passed into them in the horizontal supine position, with the head extended, as in Fig. 1.

B.—FROM THE ANÆSTHETIST'S POINT OF VIEW.

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General Considerations.—Perhaps in no department of surgery is the practice of anæsthesia more difficult than in that which is engaged with operations upon the upper air passages. It is, however, seldom that the dangers and difficulties are appreciated ; many undertake the responsibility without experience or knowledge of the best and safest methods. It is to supply succinctly an account of such methods that the present paper has been undertaken.

The main necessities of such cases are knowledge of the

requirements of the surgeon in the various operations, the required posture of the patient, the dangers incidental to the particular case, and the best measures to adopt on the one hand to prevent, on the other to remedy, them. While many of such operations are slight, some involve great shock; but in all cases the patient runs grave risks if the anæsthetic is carelessly or inexpertly administered. The dangers are two-fold—peril to life, and secondly the possibility of stultification of the surgeon's greatest skill through failure of the anæsthesia at a critical moment.

Anæsthetics and Apparatus.—Nitrous oxide alone or with oxygen, chloride of ethyl, bromide of ethyl, ether, chloroform, and some mixtures or sequences of these will in certain cases be required, and a competent knowledge of their especial properties is presupposed by the writer.

The apparatus employed in different cases will be described below, but it may be said here that especial care in sterilising all apparatus is called for as the field of operation in the cases with which we are dealing is in close proximity to the administrator and his armamentarium.

The anæsthetist should cleanse his hands thoroughly, should replace his coat by a clean linen jacket or towel, and have his arms bared. All metal portions of the apparatus should be boiled before use, while the rubber parts should be washed with soap and water, placed in carbolic acid solution (1 in 20) for a few minutes, and subsequently washed in sterile water to avoid burning the face.

No attempt will be made in the present paper to indicate in detail the countless apparatus, all of which may possess value, but to mention those which the writer thinks to be most generally useful.

Terms used.—Children is taken to mean persons under 6; youths those between 6 and 15; adults those above 15; and the aged those over 60. These divisions are arbitrary, but their adoption will save reiteration.

By short operations is meant such as are completed in five minutes, by prolonged operations those which require an hour or upwards. Anæsthesia is taken to imply complete unconsciousness to pain and external circumstance. Narcosis is adopted as a term descriptive of the condition of the patient

as soon as he inhales an anæsthetic. It may be light, as before the loss of conjunctival reflex, or profound, as when the anæsthetic is pushed and the respiration is affected and blood pressure is markedly lowered.

Age and Sex of the Patient.—The largest number will be children or youths, and it must be carefully noted that no period of life is immune from the dangers and difficulties of anæsthetics. While the very young and the aged are more prone to bronchial and pulmonary complications than are adults, there is no inherent difference except in individuals as to their reaction towards any particular anæsthetic, hence each case irrespective of the age must be studied before the selection of the anæsthetic is made. Sex in this relation may be disregarded, except that women at the time of menstruation, during pregnancy (after the sixth month), and lactation are more upset by anæsthetics than at other times.

Operations.—For short operations, such as cauterisation of the nose, uvulotomy, nitrous oxide gas mixed with oxygen or air answers well. Although, as will be pointed out below, the removal of post-nasal adenoid growths and tonsillotomy are best performed under one of the non-gaseous anæsthetics, a single pad of growth or mild case may be done under nitrous oxide. In the same way tonsillotomy can be performed, and instances arise where special reasons exist for relying solely upon the simpler anæsthetic. With nitrous oxide gas and air or oxygen in the case of youths, a period of forty seconds can be usually obtained, but when there is much obstruction to respiration this anæsthetic gives unsatisfactory results. A case of death has been recorded when nitrous oxide gas was given to an adult to enable the surgeon to incise an abscessed tonsil. In this case the air passage was nearly closed by œdema and inflammatory swelling.

Procedure.—The patient is either seated in a chair or lies upon a couch, the shoulders and head raised by pillows. The position selected by some surgeons, in which the patient's head is sharply extended upon the trunk and lies at a lower level, is not one suitable for a " gas " operation, as it causes lividity and increases bleeding.

The mouth is then propped open by a Doyen's gag placed securely between the front teeth and the mask applied.

To prevent air entering by the handles of the gag, the mask
may be surrounded by a wet towel or piece of wet lint.

When stertor is heard the airway tap should be opened
for one inspiration and then the nitrous oxide re-supplied.
The breathing becomes regular and slightly snoring, and at
this stage the mask is rapidly removed, and the anæsthetist
holds the patient's head firmly, varying its position to suit the
requirements of the surgeon. It is important to avoid cyanosis,
and this is easily done when air or oxygen are employed
together with the nitrous oxide. Hæmorrhage when present
requires that the head should be flexed so that the blood and
clot may pass from the mouth.

For longer Operations.—Ether consecutive to nitrous oxide
gas or chloride of ethyl may be used, and when a still more
extended period is needed this sequence may be followed by
chloroform. The writer is not in favour of the use of chloro-
form in minor operations except in the manner described below,
but of course it can be employed *ab initio*, provided the
patient is lying down. The A.C.E. or C.E. mixtures are also
commonly used.

In the case of a child or youth with post-nasal adenoids
and tonsils, when all have to be removed, the following plans
may be adopted :—

    I. Nitrous oxide followed by ether, followed by chloro-
        form—if needful.

    II. Chloride of ethyl, followed by ether and by chloro-
         form—if needful.

    III. Chloroform or a mixture of this anæsthetic with ether
          (2 parts to 3 respectively).

Procedure.—The posture as above. When chloroform is
given, however, the patient must be recumbent.

The gas and ether regulator devised by Clover and modified
in the manner suggested by the writer or by Dr. Hewitt or
Dr. Probyn Williams can be employed. These are better than
an Ormsby's inhaler. The gag need not be inserted before
inhalation is commenced, although if there is much obstruction
the insertion of a small dental prop attached by fishing cord
outside the mouth assists breathing. The patient then inhales
nitrous oxide until respiration has assumed a regular even
rhythm, when ether is turned on gradually. Sudden strong

vapours are always bad and often dangerous, as they produce spasm, coughing, cyanosis, and impede anæsthetisation. As soon as conjunctival reflex has disappeared, air should be admitted, the mask being completely removed until the face assumes a bright cherry colour. If chloroform is to be used in sequence it should now be commenced, a modified Junker[1] being used. If, however, ether is to be employed without chloroform, and it is sufficient for most cases, the patient has the mask reapplied until the muscles are quite flaccid and the breathing is slightly snoring. In the case of young children it is safer not to push the anæsthetic, but to operate as soon as conjunctival reflex has vanished and the breathing has assumed a regular rhythm. The danger of a profound anæsthesia is the liability of blood being aspirated into the trachea. It is important that the anæsthetist should bear this in mind and assure himself that respiration is unimpaired at all stages of the operation. When the patient is seated upon a chair the head must be flexed and the blood removed, if he is lying upon his back he must be turned over on his side, almost upon his face, as soon as the operation is completed with the same object. If the operation is not finished under ether and chloroform is administered, it is well to substitute that anæsthetic early in the narcosis, as described above, and continue its administration by the use of a mouth tube, the vapour being propelled through it by a Junker's apparatus. When chloroform is employed there is always a danger of too deep a narcosis being produced. Deep narcosis in these cases is both dangerous and unnecessary. The very manipulations of the operation and the brisk effusion of blood which are inseparable from these cases interfere with respiration, and fatal results are likely to ensue if profound chloroformisation has been practised. Although the conjunctival reflex should be absent, cough and swallowing should persist, the pupil should have a brisk reaction to light and the colour should be bright. Ashen or white faces mean danger, and the operation should be deferred until the child has practically come out of chloroform. It must be distinctly understood that the patient must be *completely anæsthetised* before the operation is commenced

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[1] The form employed by the author has a glass face-piece, and is made by Messrs. Mayer and Meltzer.

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but on the other hand a light narcosis is best and safest, and into this condition it is easy to guide the patient when once anæsthesia has been established. A word may be said as to feeding. Although a laden stomach is to be avoided, a prolonged fast is equally detrimental in the case of delicate children. Bread boiled to pulp in milk may be given for an early breakfast when the operation is done about 10 a.m., or a light meal of clear mutton broth taken at noon if the surgeon is to come at 2.30 or 3 p.m.

It is well to aim at an interval of three hours between the meal and the anæsthetic in the case of asthenic subjects. Sturdy, full-blooded boys are best handled after a fast of six hours.

II. When chloride of ethyl is given, 5 c.c. for a youth or an adult, 3 c.c. for a young child, will give from two to five minutes' period of insensibility. If a special inhaler is used, the pattern called the " Ideal "[1] or " Simplex "[2] answers well. No sponge should be placed between the bag and the face-piece. The patient should be in the desired position and told to breathe steadily into the face-piece, and its accurate fit arranged. Three c.c. are then sprayed through the filling tube directly into the bag. As soon as respiration is regular, *i.e.,* in about 30 seconds, an additional 2 c.c. are sprayed in —more or less according to the age and physique of the patient. When the breathing becomes slightly snoring and the eye is fixed, which occur usually in from 45 seconds to 1 minute, the inhaler is withdrawn.

If ether is to be given in sequence, the ether inhaler now replaces that used for the chloride of ethyl. If not the operation is commenced. As to re-application of the chloride of ethyl or ether inhalers. In the case of an operation being prolonged beyond the anæsthetic limit the inhaler duly charged may be again applied, provided the colour of the patient is good, respiration is unhampered, and the hæmorrhage is not severe. A word with regard to the use of the galvano-cautery after chloride of ethyl or ether. It is sometimes done, and then great care and judgment are necessary, as if there is undiluted ether

[1] Made by the Dental Manufacturing Company for Mr. Vernon Knowles.
[2] Made by Messrs. Duncan and Flockhart.

or ethyl chloride vapour present there is danger of explosion This " setting fire " to the patient has, it is stated, taken place.

III. In very young children, and in the case of patients to whom it may be considered undesirable to administer ether or chloride of ethyl, chloroform may be given *ab initio*. This may be done in various ways. The best is by the use of a reliable regulating inhaler such as that devised by Mr. Vernon Harcourt. With this inhaler, commencing with a low percentage vapour, such as · 5 per cent., and gradually increasing the strength to 2 per cent., a sleeplike anæsthesia is obtained. During a prolonged operation the anæsthesia can be maintained by the mouth tube and a Junker's inhaler.

When an apparatus is not available the use of a Skinner's or Schimmelbusch's mask with a drop bottle will, if carefully watched, give a satisfactory result, always provided respiration is heedfully noted, and the anæsthetic removed when any holding of the breath, struggling, or interference with respiration occurs. Light narcosis is essential.

In young asthenic subjects the C.E. or A.C.E. mixtures may be called into requisition. The former is the same as the more familiar A.C.E. in which the alcohol is omitted. These mixtures are best given to children from a mask, the narcosis being somewhat deepened by the use of a cone made of linen or celluloid. Proprietary preparations of ethyl chloride, ethyl bromide, and methyl chloride do not possess any special merits, and the same may be said of bromide of ethyl, pental and other bodies. They are not superior to chloride of ethyl and appear less safe.

Operations upon the Nose.—These may be of short or long duration. For short operations nitrous oxide or chloride of ethyl alone, or followed by ether, answers extremely well. Many surgeons, however, object to ether on account of the fear they entertain that its use may cause hæmorrhage. If properly given it is doubtful whether ether does lead to more bleeding than other anæsthetics, especially when the mucous membrane is treated with cocaine and adrenalin immediately before operation. In passing we may caution inexperienced anæs-thetists against leaving nasal plugs or cotton-wool tampons in the nostrils when they commence the administration. There is always the danger of their being dislodged, and causing

difficulties by falling over the epiglottis or into the glottis. Failing the use of ether, resort must be had to chloroform given by preference in succession to nitrous oxide or chloride of ethyl in sequence with ether. The narcosis once established, anæsthesia must be maintained by the use of the mouth tube.

The C.E. mixture, given first from a mask, then from a Junker's inhaler or a cone, is a useful anæsthetic for nasal operations. As the bleeding is often pretty severe, a profound degree of narcosis is dangerous and must be avoided. It is wise in all these cases to take some time over the induction in order that the blood shall be evenly, although not deeply, saturated with the anæsthetic. The great danger is lest a sudden large dose is inhaled which proves perilous, whereas it would be absolutely safe if properly commingled with the blood mass as a whole. During the operation it is, as a rule, better to withhold the anæsthetic. Attention must be paid to the position of the head so that blood may drain away from the larynx and out of the mouth.

Operations upon the Thyroid Body and Larynx.—A rather unusually wide experience with anæsthesia during the removal of goîtres has led the writer to believe that chloroform is the best and safest anæsthetic for these cases.

The example of Professor Kocher has led some operators to believe that general anæsthesia increases the risk of removal of adenomata and other tumours of the thyroid. This supposition is, we think, wholly devoid of support from experience. The idea that the operation after the initial incision is painless is erroneous, and the many objections to infiltration anæsthesia with cocaine are emphasised in the case of goître. The patients are peculiarly liable to nervous shock and cardiac inhibition, and run no small danger when general anæsthesia is not practised.

As the present writer pointed out in a paper read before the Harveian Society, the danger of chloroform in these cases lies in the reckless way in which it is used. If it is once recognised that the dose of this anæsthetic should in all cases be carefully adjusted to the degree of stenosis of the larynx, and narcosis always stopped short of the loss of complete muscular tonus, all goes well. In severe cases, if this precaution is overlooked, the dyspnœa is increased, the airway becomes practically obliterated, and serious dangers arise.

The Vernon Harcourt inhaler is the ideal instrument for such cases, as a 1 per cent. vapour is usually ample, and is, in the writer's experience, free from danger. When the less exact methods of a drop-bottle and mask, or even a Junker's inhaler, are employed, the indication is to induce anæsthesia slowly, and during the operation enforce a light anæsthesia. The respiration and colour must be sedulously watched, and dyspnœa or cyanosis avoided by minimising the strength of vapour used, even if this entails a prolonged period of induction.

Laryngectomy. — In experienced hands this formidable operation is not, as a rule, a crux for the anæsthetist. Unless in very exceptional cases, when ether is given by the rectum, chloroform should be employed. In the former procedure grave risks are run, so that its use must be carefully weighed before adoption.

The writer prefers to give chloroform first by a regulating inhaler, but the less precise methods are of course applicable until the air passages are opened and plugged. It is then better, we think, to employ a Hahn's tube and pump chloroform vapour from a metal tube attached to a Junker's inhaler than to adopt the Trendelenburg's method. The main point to remember is that when you give chloroform vapour direct to the trachea, you give a stronger percentage than when your patient breathes the vapour and so caution is needful. Surprisingly little is required. It is a golden rule in all laryngeal as in other operations never to give a drop more of any anæsthetic than the condition of the patient and the necessities of the operation require. It is easy to add, you can never subtract what you have given. A further point is that in all prolonged operations, as the time goes on, the patient needs less and less of the anæsthetic, and the less he takes during the surgical procedure the more is the after shock minimised.

In conclusion, a few words may be added about anæsthetics in aural surgery. Chloroform for all operations except the briefest is the best. The anæsthesia once established, the patient usually requires little to maintain the insensibility. The nitrous oxide, ether, chloroform sequence answers well. Chloroform should be used in conclusion in order to ensure lowered blood pressure and so lessen hæmorrhage. Ether for

these reasons is contraindicated except during the period of induction.

Tracheotomy, when undertaken for some acute cause which has induced respiratory difficulty, should be performed under chloroform. Ether or any mixture containing it usually increases the dyspnœa and suffering. In such cases the most open method possible is indicated. A few drops of chloroform sprinkled at intervals upon a handkerchief or mask should be given, and analgesia rather than complete insensibility be aimed at, especially when the patient is asthenic, dusky with retracting ribs.

Enough has been said to indicate, it is hoped, that anæsthesia in all the above cases presents pitfalls and needs great care. It is believed that the notes may warn about the pitfalls, and may assist in avoiding them, since to be forewarned is to be forearmed.

SOME POINTS IN THE SURGICAL TREATMENT OF INTESTINAL OBSTRUCTION.

By T. CARWARDINE, M.S., M.B. (Lond.), F.R.C.S.,

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THERE are few surgical conditions of such importance to the practitioner as intestinal obstruction ; for not only does the disease require early and judicious treatment for its relief ; but, in many cases, when far removed from special aid, the practitioner must utilise his own operative resources, and in all cases he has the responsibility of an early estimate of their gravity.

Intestinal Obstruction essentially Surgical.—By the time a medical man is consulted by a patient for " stoppage " it may be taken as a principle that great caution should be exercised in the administration of aperients. In cases of acute intestinal obstruction they are harmful without exception ; and when the symptoms are of a more chronic character the patient may be assumed to have tried the purgatives with which he is familiar. It is the greatest wisdom in such cases, therefore, to stop all solid food, to examine the abdomen for any tumour, tumidity, or visible peristalsis, the common sites of herniæ, and the rectum for impacted fæces or new growth ; and, in the absence of any assignable cause, to treat the obstruction entirely by enemata. Until there is a good result from this treatment it is safer to withhold purgatives by the mouth.

Should enemata fail to act in an adequate manner, and if vomiting should at once supervene, the case must be regarded as surgical in its aspects. For a patient to hope against hope that waiting, or a new drug, or a fashionable physician can do what repeated enemata fail to do, is to court disaster. Since the possible saving of life will depend largely on a surgical decision, and particularly upon any necessary surgical treatment being carried out at an early stage, it is advisable to face the facts, and I can only endorse the words of Mr. Edmund Owen—" I am strongly of opinion that all cases of intestinal

obstruction are surgical from the very beginning, and that they are quite out of place in a medical ward." [1]

Time as a Factor.—The importance of time as a factor in success can be best estimated by reference to cases of strangulated hernia; for in them, as a rule, a definite onset is ascertainable, the time of first vomiting being the best criterion. I have elsewhere compiled the results of 183 operations for strangulated hernia during the recent decade [2] which show that there were over 98 per cent. of recoveries in those operated upon within 12 hours, that there were less than 90 per cent. of recoveries when 12 to 24 hours had elapsed; and that the mortality progressed with the duration of strangulation, when, after 5 days had elapsed, only 40 per cent. recovered. When intestinal obstruction is due to other causes than hernia, the operative mortality is increased by the difficulties of early diagnosis and treatment, and by the fact that the risk is increased from the presence of advanced malignant disease. And I find that out of 71 cases of intestinal obstruction at the same institution, during the same period, excluding herniæ, 24 recovered and 47 died. This probably fairly represents the prospects of life in hospital cases ; and it may be stated generally, from these figures and from a perusal of others, that out of every three patients with intestinal obstruction only one recovers. It is true that that life is one saved ; nevertheless, the other two are disappointing losses ; and we can only hope for some improvement in the results by earlier diagnosis and earlier surgical treatment on the right lines. Meanwhile we may be grateful that the present age can witness a saving of life unknown to ages past.

The Primary Importance of giving relief to the Obstruction, and the Secondary Importance of the Removal of the Cause of the Obstruction.—This is the principle which should be ever present in the surgeon's mind. The patient is *not* dying from the band, the stricture, or the tumour causing the obstruction ; but in the main from intestinal toxæmia—just as much as a patient dies from uræmia in some form when there is complete urinary obstruction. And, as in the latter, the first essential for the time being is to relieve the retention, so, in the former,

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[1] *Brit. Med. Journ.*, 1901, II., 573.
[2] *Operative and Practical Surgery*, p. 492.

the drainage of the bowel is of the prime importance. The principle in the one case is conceded everywhere, but in the other, how hard a lesson do we learn ! And how great the temptation to remove the disease first hand, rather than the toxic material which is the real menace to life ! Mechanical strangulations of all kinds, which forbode gangrene of the gut, must of necessity be corrected at the time ; but the surgeon, who takes to heart the prime importance of preliminary drainage of the distended bowel in all other cases, will assuredly find more satisfactory results. To quote the words of the late Mr. Greig Smith—and I can vouch for his having carried them into effect in his practice—" if the cause can be removed only after a prolonged and difficult operation, then I maintain it is better to temporise, save the patient's life by enterotomy, and remove the constriction afterwards when the patient can bear it."

We have experimental evidences for the toxæmia from which patients with intestinal obstruction suffer. And the toxæmia is of peculiar clinical type ; for what is more striking than what one sometimes observes clinically—a patient with intestinal obstruction, able to converse, sitting up in bed, yet with cold clammy hands, and absolutely pulseless. It is difficult in such a state to realise, and to convince the friends, that within a short time the patient will be dead.

Although, in animals, the small intestine is said to be sterile when empty, or, according to some observers, that it has a certain controlling power over bacterial growth ;[1] when the regulation of bacterial growth is disturbed by mechanical or other means, especially when accompanied by stasis, there is a great increase in the number, variety, and virulence of the organisms ; and they become plentiful in the jejunum as well as in the ileum. Dr. P. Clairmont, of Vienna,[2] showed that the toxins, produced in cases of intestinal obstruction, are the result of the bacterial action, and act as potent poisons when administered intravenously or hypodermically. One had hoped that serum-therapy might have rendered assistance in cases of intestinal obstruction. But Clairmont has found it impossible to establish either active or passive immunity to the poisons,

[1] Lorrain Smith and J. Tennant, *Brit. Med. Journ.*, 1902, II., 1941.
[2] Proceedings of the German Surgical Congress, 1903.

although the toxic action could be neutralised by admixture with brain substance.

Enterostomy, therefore, has great value in relieving patients of the toxæmia of intestinal obstruction, and unless this be done as a preliminary measure in the most serious, or as part of the technique of a more radical operation in the less serious cases, the main essential will be lacking. *No operation for serious intestinal obstruction can be considered adequate unless an immediate evacuation of the intestinal contents be assured.*

It would be impossible to compass the whole subject of intestinal obstruction within the limits of a short paper, so I propose to deal with a few points concerning the administration of enemata, and the performance of enterostomy and enterectomy, in the hopes of being of some assistance to many who are removed from our great surgical centres, and who may be called upon, in emergency, to do one or other operation rather than allow a patient to succumb because more skilled assistance is inaccessible.

ON THE ADMINISTRATION OF ENEMATA IN INTESTINAL OBSTRUCTION.

This preliminary measure must not be left to the nurse, but must in all cases be carried out by the doctor himself. Nurses often fail to wash out the bowel above the rectum, and their interpretation of what is a good motion, in the circumstances, is apt to be uncertain. The practitioner should, himself, ascertain whether the fluid enters the colon, and, himself, estimate the result, both as regards fæces and flatus, and the latter is of no less import than the former. The enema should be copious—two pints or more—for the rectum alone will hold a pint ; and turpentine, oil of rue, or colocynth may be added to stimulate a greater degree of peristalsis ; and one must first ascertain by digital examination that there are no hard masses in the rectum to block the nozzle. It has been customary with some to administer the enema by a so-called long tube, guiding it into the sigmoid flexure if possible. But more often than not this cannot be done satisfactorily, the tube tending to coil in the rectum. For years I have practised, and in 1900 published, a method which yields far more satisfactory results, the fluid being allowed to run into the colon by

gravitation from an ordinary irrigator or Higginson's syringe. The patient is placed on the *right* side with the head low, and at least a couple of pillows are placed under the pelvis so as to make the rectum the highest part of the large intestine. The warm irrigating fluid is then allowed to run in from the irrigator, held not more than two feet above the level of the anus, whence it will usually pass along the lower and transverse colon into the ascending colon. (Fig. 1.)
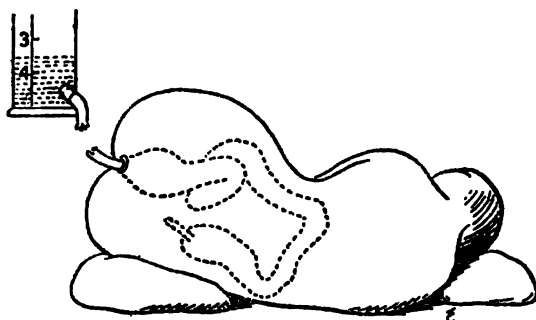
Fig. 1.

In this way a much larger quantity of fluid can be employed, its retention made more certain, and it is less often prematurely expelled. If there be no organic obstruction in or near the rectum, two or three pints can be easily injected by this means, and the passage of the fluid may be observed by auscultation over the colon. Instead of medicated soap and water, it may be advisable, when collapse is marked, to employ a large quantity of warm normal saline or fresh milk. To merely wash out the rectum by a small enema in a case of intestinal obstruction is useless : one must act on the principle of irrigating the colon, if possible ; and this can be best effected by the method described above, and is that which I always employ for the purpose.

Enterostomy for intestinal obstruction may be of three classes :—1. Provisional. 2. Temporary. 3. Permanent.

PROVISIONAL ENTEROSTOMY.

This comprises measures, including enterostomy with evacuation, undertaken to empty the bowel at the time of operation, the gut being sutured and returned before the operation is

completed. It is an enterostomy for evacuation only, performed during the operation.

In the method hitherto adopted, and still useful in many cases, the sutures for the parietal wound are placed in position ready for tying, and a loop of distended bowel is brought out on to the surface : the anæsthesia may then cease, the subsequent procedures being carried out during returning consciousness. It is unnecessary to continue the anæsthesia, for the bowel can be incised without giving pain. The wound is protected by surrounding the bowel with gauze or otherwise. The loop of bowel is supported by holding the mesentery with the thumb and forefinger of the left hand, and an incision about an inch in length is made in the free border of the gut. Flatus at once escapes, together with some fluid fæces which are collected in a receiver, and the exposed bowel collapses (Fig. 2). Then other loose discharges may take place at intervals till the neighbouring bowel has become empty. Then a lull occurs, and further evacuation may be induced by gently kneading the abdomen, first at one part then at another.
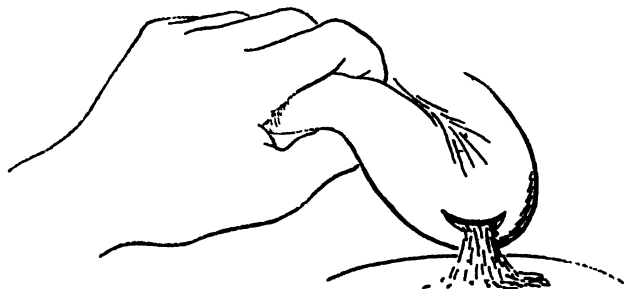
Fig. 2.

When the abdominal distension has subsided the gut may be sutured by a double row of continuous sutures of fine silk, thoroughly cleansed, and returned into the abdomen. The sutures of the abdominal wound, already placed, may then be tied.

A similar means of emptying the gut may be adopted after the relief of an obstructing cause, such as a band, and as the patient is recovering consciousness. Although the cause of the obstruction may have been removed, it is the best practice, whenever there is much distension of the intestine, to evacuate

the toxic contents of the intestine before completing the operation.

But I would ask attention to another class of cases to which I have given some thought. The extreme danger of prolonged anæsthesia, or even of short general anæsthesia, is well known to surgeons of much experience. Owing to belching, or vomiting of large quantities of stercoraceous vomit, there is the gravest possible risk of the patient being suffocated thereby, with little, if any, warning of what is impending.

There are certain cases, such as adhesions between several coils of gut, in which an effective operation takes some little time ; but this period, though no longer than necessary, may be one of peril from stercoraceous vomiting. A case of this character occurred to me. An elderly lady, weighing 14 stone, had intestinal obstruction from a convoluted and adherent mass of small intestine, the liberation of which probably took a quarter of an hour. So far, the operation was a very successful one, but when the suturing of the abdominal wound was nearly completed, the anæsthetist reported that she had apparently vomited, and had ceased to inspire air, though occasional inspiratory efforts occurred. Though heavy, the patient was at once turned over and partially inverted, and a copious flow of fæculent material ran out of nose and mouth. Tracheotomy and artificial respiration were performed, but without avail, and what promised to be a successful operation became a disaster in a moment.

When thinking over the case subsequently, it occurred to me that some simple method might be devised by which a preliminary enterostomy could be performed in such a case, *and the bowel above the obstruction be allowed to drain during the whole time of the operation from the very first.* By this means, not only would the contents be evacuated, but the risks of fatal vomiting would be lessened. For this purpose it was necessary to devise a simple means of draining the bowel, without risk of leakage or mishap, while the surgeon is engaged upon the obstructing lesion. I venture to propose the principle that *before dealing with the obstructing lesion provisional enterostomy should be performed, and the intestinal contents be allowed to drain away during the whole time of operation.* With some thought, and the assistance of Messrs. Down Bros., I have

devised an enterostomy tube for the purpose; and have also extended its use to temporary and permanent enterostomy. It has the disadvantage of cost over Paul's tube, but, on the other hand, it is more secure, and does not strangulate an area of the bowel wall—a consideration of importance, particularly in the small intestine.
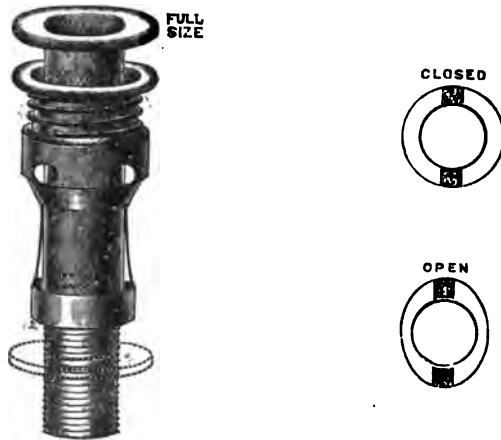
Fig. 3. *Author's Enterostomy Tube.*

The enterostomy tube (Fig. 3) is employed in the following way for preliminary enterostomy. The selected portion of gut is clamped in two places by bowel clamps, or the fingers of assistant placed back to back, with sufficient interval between. A short incision is made into the bowel, and a purse-string suture of fine silk inserted round the margins of the aperture which may comprise all the coats at the margin. The central tube is then inserted into this aperture and the purse-string suture drawn tightly so as to apply the margins of the aperture in the gut over the flange of the tube. If for mere preliminary enterostomy the thread may be tied in a bow. Then the outer spring button is passed over the other end of the tube, and pressed home so as to lightly clamp the margin of the gut; and a long piece of indiarubber tubing is passed on to the free end of the tube.

The clamps, or fingers of the assistant, can then be removed, and the intestine will immediately drain through the tube into

a receptacle placed below the operation table. The operation of the obstructing lesion is then proceeded with (Fig. 4), and
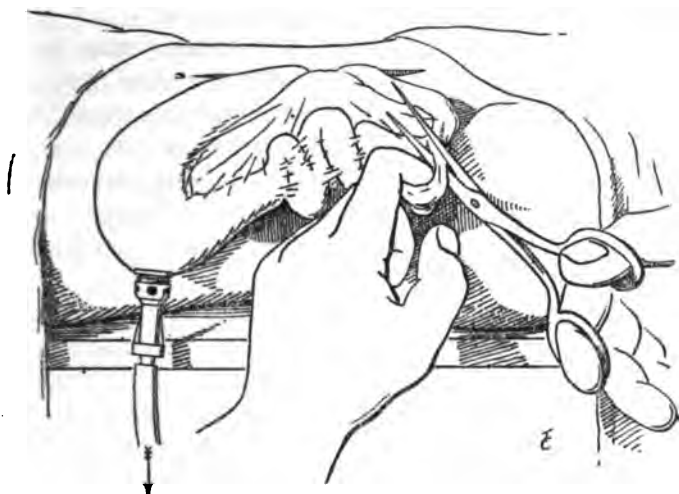
Fig. 4. *Author's Enterostomy Tube in use during Operation.*

after it is finished, the bowel having drained the whole time, the gut is again clamped near the tube, the rubber drainage tubing removed, then the spring button. The bow-knot of the purse string suture is untied, the inner tube removed from the bowel and the purse-string suture drawn tight and tied, so closing the aperture in the gut, and this is reinforced by an outer continuous or interrupted suture. The loop of bowel is released, cleansed, and returned into the abdomen. If it be desired to continue the drainage as a longer temporary measure, the tube can be left in and included in the abdominal wound, with some gauze around the part which projects. The intestine then rests just within the abdominal cavity ; later on, the tube can be removed as described and the bowel sutured *in situ* where it will have become adherent.

TEMPORARY ENTEROSTOMY.

Temporary entorostomy is employed when the drainage of the bowel is to be continued for some time after the operation. *a.* When the condition of the patient is desperate, and all that can be done with safety is to bring out a distended loop of bowel through a small incision under local anæsthesia, and to

put in a tube of some form for drainage. *b.* When the con-
dition of the patient permits a more complete exploration, but
a lesion is discovered the radical treatment of which must be
postponed.   Here a temporary enterostomy may be done
above the obstruction.   *c.* When the involved gut can be
brought out with the lesion for subsequent treatment, but the
distended bowel above the lesion drained at once.   *d.* When
the involved gut is brought out, a portion removed, and
drainage established for a few days.   Classes *c* and *d*
will be considered later, under enterostomy combined with
enterectomy.

For the desperate cases of class *a*, and for those of class *b*,
when the lesion is left for a time within the abdomen, there
have been two methods hitherto in use, and I venture to
suggest a third which I have introduced and employed. These
differ in the character of the drainage-tube employed, but the
essential preliminary details are similar for all three. The
loop of bowel is extruded, and after the wound has been
sutured (without tying the sutures) and protected, the assistant
compresses the loop on each side by means of the second and
third fingers of the right and left hand respectively, held back
to back.   Then an incision is made in the free border of the
intestine slightly smaller than the tube to be inserted. The
mucous membrane is then caught up on each side with fine
forceps and the tube inserted.   After the tube is securely fixed
in position, the assistant ceases his compression of the bowel,
the liquid fæces and flatus escape, and the loop of bowel
becomes collapsed. It is then cleansed and returned to just
within the abdomen in such a manner that a portion of the
circumference of the bowel is exposed against the raw surface
of the wound for sero-muscular union. The parietal sutures
are then tied, except one, which is tied later on when the tube
is removed and the bowel is allowed to drop back again into
its place.   Then the wound is dressed. A piece of gutta-percha
tissue, or oiled silk, is placed around the bowel and tube to
prevent the lymph, which soon appears on the gut, becoming
adherent to the dressings. Then strips of moistened gauze
or boric lint are wrapped round, then a little absorbent wool.
The whole is best secured by passing under the patient's back
a wide and long piece of strapping, splitting the two ends,

and interdigitating the split ends around the tube. A reservoir, such as a large and wide-necked bottle, is provided for the reception of the fæces. Whether a small or large tube should be employed will chiefly depend upon whether the small or the large gut is to be drained.

The character of the tube employed gives the name to the method, and the foregoing details are based on the practice of the late Mr. Greig Smith.

Greig Smith's Method.—This surgeon almost invariably employed a piece of stiff indiarubber tubing for the purpose, preferring this to Paul's tube. It yields to movement, can be inserted on the stretch so that it entirely fills the hole in the bowel, is usually at hand in emergency, and can be easily fixed (Fig. 5a). A slight modification can be used in the lower bowel or just above an obstruction, the tube being passed into the upper segment (Fig. 5b). The tube generally loosens from the bowel within three days.
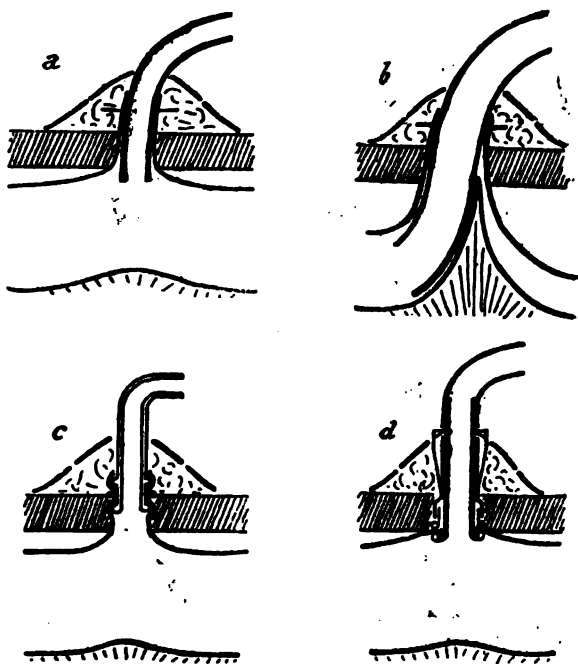

Fig. 5. *Methods of Temporary Enterostomy.* (a) *Greig Smith's.*
(c) *Paul's.* (d) *Author's.*

Paul's Method (Fig. 5c).— A small Paul's glass-tube is inserted into the lateral opening of the bowel, and the wall of the bowel secured between the two flanges by an encircling ligature. This method has the disadvantage that the tube is apt to slip out prematurely, and that the constricting ligature causes a ring of bowel to slough beyond it ; and as the ligature cuts through the tissues enclosed, the tube usually falls out in two or three days.

Author's Method (Fig. 5d).—For this, the special enterostomy tube (Fig. 3) is employed in the manner already described. It has the advantage of a more secure hold upon the bowel, with less tendency for a ring of gut to slough, and, when it is removed, the lateral aperture in the gut can be easily sutured. I have found the tube remain for six days without separating.

ENTEROSTOMY THROUGH THE APPENDIX (APPENDICOSTOMY).

In connection with temporary enterostomy it may be well to say a few words on an operation described by Dr. Robert F. Weir nearly two years ago (*vide* Ann. Surg. 1903, I. 614). In this operation the appendix is fixed to the skin of the wound made by separating the muscular fibres in the right iliac region, its tip cut off, and the lumen of the appendix utilised for irrigating the large intestine with medicated lotions for certain diseases of the large bowel. Dr. Willy Meyer has also suggested, with a certain amount of reservation, that the appendix might be so utilised for the relief of obstruction of the large intestine, provided its calibre be adequate. A soft rubber catheter is employed for irrigating purposes, passed through the appendix into the cæcum. The method has also been used in America by Dr. Dawbarn for amœbic colitis ; by Dr. Willy Meyer for syphilitic ulceration of the colon and rectum, and for multiple papillomata of the large bowel ; and by Dr. Howard Lilienthal for papillomatous colitis (a failure), and for two successful cases of ulcerative colitis.

Appendiceal enterostomy is a fascinating and ingenious suggestion, and with probably take a secure place in the treatment of chronic ulcerative conditions for the large bowel.

(*To be continued.*)

PLATE II.

STRUENSEE.

BY-PATHS OF MEDICINE.

DOCTOR AND DICTATOR.

[With Plate II.]

THERE is a saying that journalism may lead to anything in France—provided it be given up. To a certain extent the same may be said of the profession of medicine. Till lately a medical man was President of the Swiss Republic. At the present time there are at least two medical Prime Ministers. Virchow was the leader of the Liberal party in Germany and withstood Bismarck to his face. Clemenceau was a long time leader of the Radical party in France and is still a political force to be reckoned with in that country. A doctor, who till the other day was Governor of Cuba, seems to have a good chance of becoming Commander-in-Chief of the United States Army. Another doctor not many years ago played a conspicuous, though not altogether glorious, part as the leader of an army in South Africa. A doctor is now Minister of Public Instruction in Italy. A doctor was Minister of Marine and another doctor Minister of Agriculture in France ; yet another doctor is a Minister in Portugal. Baron Stockmar, who was a doctor, was for many years political adviser to Queen Victoria and the Prince Consort. We have grown accustomed to see medical men in the character of colonial governors, administrators, ambassadors, and explorers. There is therefore no lack of romantic possibilities in the profession of medicine, dull as is for the most part the atmosphere of the average doctor's daily life. The careers of many practitioners would furnish material for thrilling tales of adventure and plots for historic tragedies or for dramas of passion and intrigue.

In the history of the medical profession there is no career presenting so sudden a rise to the highest power, or so swift and awful an eclipse, as that of Struensee, the doctor who in the middle of the eighteenth century was for a short time dictator of Denmark. The story is one of the most terrible and pitiful of "world tragedies," full of horror and shame and tears. It may be read in detail in Mr. W. H. Wilkins's strangely

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interesting book "A Queen of Tears,"[1] in which the sad story of Caroline Matilda, Queen of Denmark and Norway, and sister of our own George the Third, is fully related, for the first time in English. From that work the following short account of Struensee is compiled.

John Frederick Struensee was born at Halle on August 5, 1737. His father was a minister who later gained a prominent position in the Lutheran church, and his mother was the daughter of Carl, Physician-in-Ordinary to King Christian VI. of Denmark. Young Struensee early gave proof of great ability. At the age of 14 he entered the university of Halle, where he took the degree of doctor of medicine before he had completed his twentieth year. In 1757 his father was appointed chief preacher in one of the churches of Altona, which was then within the boundaries of Denmark. Young Struensee accompanied his family, and a few months later obtained the post of public medical officer to the city of Altona and surrounding districts.

He soon became extremely popular, especially with ladies, who were, he boasted later, all his life his best friends. Through the influence of some of them he became acquainted with the stepfather of Enewold Brandt, the favourite of the reigning King of Denmark, whose fate was to be so tragically linked with his own. He also contracted a friendship with Count Rantzau, a man of dissipated character, but heir to immense estates and a great position in Holstein, who also played a principal part in the catastrophe of his career. Struensee's practice, however, did not suffice for the gratification of his extravagant tastes ; he got deeply into debt, and had made up his mind to seek his fortune in the East Indies, when an event occurred which proved the turning point of his life. In 1768 Christian VII. of Denmark passed through Holstein on his way to England. The King's constitution was so much undermined by dissipation that it was necessary for him to have a physician in his travelling suite. Through the recommendation of Rantzau and Holck, another favourite of the King's, Struensee obtained the post. His conversation interested the King and his sympathetic manner soon won his confidence. Owing to the marked regard shown for him by his Royal

master, Struensee was well received in England, where he
received honorary degrees from Oxford and Cambridge. He
accompanied Christian to Paris, when in that city he visited
the gallery at Fontainebleau, where Monaldeschi, secretary
and lover of Queen Christina of Sweden, was murdered by
order of his Royal mistress. He told his brother he had
done so in obedience to a dream in which a lady of exalted
rank (meaning Queen Matilda of Denmark, Christian's wife)
appeared to him in that gallery. His brother making no
comment, Struensee quoted his favourite motto, " All things
are possible." The story seems to show that already his
ambition, like Macbeth's visionary dagger, was marshalling
him the way he was to go. By the time the King reached
Altona, on his way home, in January, 1769, Struensee had
become so indispensable to him that Christian made him his
Physician-in-Ordinary, at a salary of 1,000 dollars a year.

When he had taken up his residence in Copenhagen
Struensee at first appeared to occupy himself only with his
professional duties, but he was all the time steadily consoli-
dating his influence with the King. By following his advice,
Christian's condition, mental as well as bodily, greatly improved,
and in gratitude he made his physician a Councillor of State.
A few months later Struensee became resident physician, a
post which gave him every opportunity of observing the state
of affairs in the Royal household. At that time the Danish
Court was split into two factions, one backed by Russia, the
other by France. It must be remembered that Denmark was
then a Power of much greater importance than it is now, and
its alliance was accordingly courted. Between the two factions
stood the reigning Queen, who was neglected and slighted by
both, and treated with indifference by her husband.

A word or two may here be said about the woman whom
Struensee was to make the instrument of his ambition.
Caroline Matilda of England was the youngest child of
Frederick, Prince of Wales and Augusta of Saxe-Gotha, and
sister of George III. She was born on July 22, 1751, and
was more carefully educated than the majority of English
ladies at that time. She was very graceful and pretty, very
generous and affectionate by nature, and of a bright, happy
temper. Married to Christian by proxy in England on
October 1, 1766, she was received with enthusiasm by the

Danish Royal Family and nobility ; but her husband soon
tired of her, and soon after the birth of her son, the future
king Frederick the Seventh, an open rupture took place.
The Queen had many enemies at Court, and her position was
well nigh intolerable when she fell ill in October, 1769. The
King became alarmed and begged her to see Struensee, and
in this way that ambitious intriguer found the opportunity for
which he had been waiting. Struensee had perceived that to
win the position of power which he coveted, it was necessary to
form a third party at Court, that of the Queen, who was greatly
beloved by the people of Denmark. The King was a wreck
in mind and body ; it was evident he could never personally
rule again, and the most natural Regent was his wife. Little
more than a child in years, and utterly inexperienced, she
would need a strong man to advise and help her, and Struensee
determined to be that man. He therefore set himself to win
her. He was a tall, broad-shouldered man, with considerable
power of fascination, and a good knowledge of medicine as it
was in his day. His treatment benefited her health, and his
intelligent conversation cheered her solitude. He persuaded
her that if she would take pains to win the King's favour she
would be able to govern in his name and so confound her
enemies. As the Queen's influence over her husband grew,
Struensee's position became stronger. At the end of January,
1770, Matilda had regained her strength : but Struensee had
by that time contrived to ingratiate himself so much that
he was given a suite of rooms in the Christianborg Palace, a
mark of Royal favour which was bitterly resented by the
Court. A little later a storm of indignation was raised against
Struensee for inoculating the Crown Prince against small-pox,
which was raging in Copenhagen. Matilda nursed her son
night and day, and thus was constantly with the doctor. The
Crown Prince recovered, and Struensee was made Councillor of
Conference, Reader and Private Secretary to the King, with a
salary of 3,000 dollars.

From that time Matilda and Struensee were constantly
together, and the King encouraged their intimacy. She had no
one to warn her or to protect her against the consequences of
her infatuation. By the spring of 1770 this friendship had
ripened into a warmer feeling and the Queen flung aside all
reserve. She now reigned supreme, her husband being quite

content to leave all authority in her hands. Early in the summer Struensee got rid of Holck, the King's favourite, installed Brandt in his place, and recalled Rantzau, a bitter enemy of Russia, to the Danish Court. Bernstorff, the Prime Minister, who favoured Russia, was dismissed, and the Princess of Wales, who visited her daughter about this time and remonstrated with her on her intimacy with Struensee, was received in a manner so much the reverse of conciliatory that the interview ended in a quarrel.

Having destroyed Russian and English influence, Struensee got himself appointed Prime Minister, and surrounded himself with colleagues on whose pliability he could count. His power was thus unlimited. He controlled all departments of the State service, and suffered no communication to reach the King except through his hands. No one had access to the Sovereign except by his permission, and such interviews as were allowed took place in his presence. He removed the only check on the authority of the Crown by abolishing the Council of State. In this way Matilda governed in the name of her imbecile husband, and through the Queen Struensee ruled as an absolute despot.

In this position of virtual sovereignty, Struensee proceeded to carry out vast schemes of reform which were to realise political dreams inspired by Rousseau and the *philosophes* who brought about the French Revolution. His aim was to break the power of the nobles and the clergy ; to establish the widest religious toleration ; to reorganise every branch of the administration on a basis of economy and efficiency ; to simplify legal procedure and place all citizens on an equal footing before the law ; to give full liberty to the press. He wished to abolish serfdom, but in the face of the opposition of the nobles he had to content himself with mitigating the condition of the serfs. His schemes included municipal as well as general reforms. The streets of Copenhagen were lighted, the houses numbered, and the management of the public funds improved. The sale of cheap bread to the poor was enforced, a hospital for 600 poor children was founded, and a Foundling Hospital established. He reformed the marriage laws, abolished useless offices at court, and reduced pensions and salaries. The economies thus effected were, however, more than counter-

balanced by lavish expenditure on court festivities. Struensee's reforms in other directions, though for the most part good in themselves, had no lasting effect. They added greatly to the disfavour with which the privileged classes regarded the doctor-dictator, and the people were not prepared for such sweeping changes.

On July 7, 1771, the Queen gave birth to a daughter, Louise Augusta, who was generally believed to be the child of Struensee. A few days later the title of Count was conferred upon him, and a rumour that he was plotting to get rid of the King and Crown Prince, marry the Queen, and establish himself as King of Denmark, found ready credence.

Struensee was then at the very height of his power and the fulfilment of his ambition seemed to be within his grasp. But the hand of doom was already writing on the wall, and although he read the fateful words they conveyed no meaning to his mind. The strain of two years of incessant work combined with gross sensual excess, had undermined his strength of mind as well as body, and fits of panic fear in which he meditated flight alternated with fatalistic confidence in his destiny.

The end came suddenly. Struensee's supposed plot to kill the King and usurp the throne was revealed to the Queen-Dowager, whom he had slighted and thrust aside. She represented the old *régime*, and she and her son Prince Frederick were looked upon as the leaders in such a crisis. A counter-plot was framed to seize Queen Matilda, Struensee, and their adherents, and force the King to proclaim a new government. A grand masked ball took place at the Palace on January 16, 1772, and the bustle and confusion favoured the conspirators, who had the nation at their back and the army at their command. Early on the morning of January 17, Struensee was seized and taken to the citadel, where he was placed in a small cell containing only a wooden stool and a pallet bed. As he tried to dash his head against the wall he was chained hand and foot. The Queen with her infant daughter was conveyed to a fortress on the point of land between the Cattegat and the Sound. The news of the favourite's downfall was received with frantic enthusiasm by the people. On February 20 Struensee was examined. Not knowing that Matilda was a

prisoner, and counting on her protection, he denied all knowledge of the plot against the King, and declared that his intimacy with the Queen was innocent. But when he learnt that she could do nothing for him, he thought only of saving himself, and signed a confession compromising her to the last degree. When this document was read to Matilda she indignantly denied the whole story ; but when she was shown the signature of her craven lover, her firmness gave way. She was induced, however, to sign a paper confirming the confession in the hope of saving Struensee's life. Her trial took place on March 14. She was divorced, and spent the rest of her short life at Celle, near Hanover, where she died on May 1, 1775, at the age of 23.

After a mock trial Struensee was sentenced to death. He was executed on April 28, in the pink silk breeches and blue coat and waistcoat which he had worn at the fatal ball. His right hand was first severed, then he was decapitated, the head being afterwards stuck on a pole and the body quartered.

Struensee was an example of what Nietzsche calls the *Uebermensch,* the man who lives only for himself and allows neither human feeling nor moral law to stand in his way. In his attempted reforms he showed a certain grandeur of aim, but his schemes were wrecked by want of political knowledge and practical statecraft. Of the institutions which he established the Foundling Hospital alone survived him. Nevertheless, when it is remembered that he began life as a doctor whose prospects were so doubtful that he thought of emigrating, that in two years he rose to be the absolute ruler of Denmark, and that he died at the age of 34, he must be allowed a place among the most remarkable men in history.

Public Health.

TRAMPS AND SMALL-POX.

By LOUIS PARKES, M.D., D.P.H.,

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LONDON suffered severely from small-pox in 1901–2, and the
metropolitan epidemic was followed by numerous provincial
outbursts, some of which are still in progress.   There appear
to be almost insuperable difficulties in this country in the way
of effectually stamping out small-pox.   The disease is intro-
duced into a district, and, as a result of prophylactic measures
energetically undertaken, it dies down and even apparently
disappears, only to reappear again after a longer or shorter
interval.   The original introductions of small-pox into a hitherto
unaffected district, and the reappearances of the disease in a
district which has freed itself of the pest by arduous and costly
efforts, have been, in quite a large number of instances, traced
to the influence of vagrants and tramps.

Ten years ago (1894) the malign influence of the tramp in
disseminating small-pox was so far recognised—very largely as
the result of a special report, by Dr. H. E. Armstrong, Medical
Officer of Health for Newcastle-upon-Tyne, on "Small-pox and
Vagrancy in England and Wales"—that a conference of Public
Health Authorities was held in London under the auspices of
the London County Council.   A number of resolutions were
adopted at this conference, having for their object the arming
of sanitary authorities with such powers as would tend towards
the control of the tramp as a disease disseminator.   These
resolutions were pressed upon the Government, but the necessity
for, or the practicability of, the additional powers sought, do not
seem to have commended themselves to the heads of the
Government Departments, for practically no result followed
upon the 1894 Conference.

Almost exactly 10 years after the first abortive conference,
Dr. Armstrong again directs attention to the pressing necessity
for some remedial action by the issue of a second special report

on " Small-pox in relation to Vagrancy in England and Wales during the year 1903." In his introduction he points out that the experience of the past decade, and more particularly of the last year of it (1903), has not only confirmed the urgent necessity for the measures advocated at the 1894 Conference, but has satisfied everyone, directly and practically concerned in the prevention of infectious disease, that the recommendations then made *did not go far enough.*

As the result of representations made by the Council of the county borough of Newcastle-upon-Tyne to the London County Council, the latter body issued invitations to a further conference on the subject in London on the 10th November last, which was attended by the representatives of 26 of the councils of the counties of England and Wales, 53 councils of county boroughs, and 26 councils of metropolitan boroughs, in addition to representatives of the City of London and of the Metropolitan Asylums Board.

The resolutions adopted by the Conference travelled rather outside the subject which the representatives were specially convened to consider, namely, the control of the spread of infectious disease by vagrants; for resolutions dealing with labour bureaux and labour colonies, and the children of vagrants, were submitted and approved. In dealing with such matters, and some others coming more within the domain of the Poor Law, it was evident that the Conference was not speaking with the authority that appertains to its public health utterances; and it is a matter of regret that there should not have been some such representation of the Poor Law administration of the country at the Conference as would have entitled its deliberations on these and cognate subjects to greater respect, when its resolutions have to be considered by the responsible heads of Government Departments.

As regards the resolutions framed for preventing the spread of infectious disease by vagrants, the difficulty that will be felt by those, who endeavour to give legislative effect to the proposals, is as to how far, and in what manner, it will be possible in a country like England to sanction methods which interfere with the personal liberty of the subject where no offence, now recognised by the law of the land, has been committed. For instance, the Conference resolved that " means should be

provided for the detention and isolation of any vagrant found
wandering in a public place, if reasonably suspected of being
liable to convey infectious disease." To give statutory effect
to this resolution it will be necessary to define a "vagrant,"
and also what is meant by "wandering in a public place." The
"habitual vagrant" is a term known to the poor law and to the
police, but it is doubtful whether the restriction of the reso-
lution to habitual vagrants would meet the ends the resolution
had in view, as at all times, and especially when trade is slack,
bonâ fide working men seeking employment travel by road
from place to place, and make use of common lodging-houses
and casual wards on their journeys. The danger of the spread
of small-pox by such men is at least as great as by the habitual
tramp or vagrant, but it is doubtful whether public opinion
would sanction their detention for a 14 days' isolation, when
travelling in search of work, unless the period of compulsory
isolation was accompanied by some form of compensation.
Again, the power to detain must involve the infliction of a
penalty in case of refusal; and the only effective penalty
would be committal to prison for a period of similar length
to that of the proposed detention and isolation.

Another resolution was to the effect that " Parliamentary
powers should be sought, for the compulsory vaccination and
revaccination of all vagrants, unable to produce proof of being
sufficiently protected against small-pox on entering casual wards
or common lodging-houses, who, in the opinion of the sanitary
authority, have been exposed to the infection of small-pox ;
and also that sanitary authorities should have power to grant
such compensation as they think necessary to persons, vacci-
nated or revaccinated at the request of the sanitary authorities,
who may be prevented on that account from work."

Having regard to the grave difficulties that must arise in
any attempt to provide special legislation for a particular class
of the community, whose poverty obliges them to be constantly
travelling in search of employment, and to frequent places
of common resort, such as casual wards or common lodging-
houses, on their travels, but who are otherwise law-abiding
subjects of the Crown, it would certainly seem wiser that
some attempt should be made, by monetary inducements and
compensation for loss of work, to arrange for the voluntary

detention and isolation and the voluntary vaccination of these people, before seeking for statutory powers of an exceptional kind. If a voluntary scheme fails, or is found too costly, then compulsory powers may have to be considered.

Subsequent resolutions of the Conference went still further, for powers are sought thereby to detain and isolate the inmates of common lodging-houses and casual wards who have been exposed to infection, or may reasonably be suspected of being liable to convey infectious disease. In these resolutions there is no limitation to the vagrant class, so that all persons frequenting such places would be liable to detention on very short notice and in a very summary manner. The period of detention is not stated, but in the case of small-pox it would presumably be the full quarantine period of 14 days. If such resolutions are acted upon, the habitual tramp and the *bona fide* unemployed working man will be alike liable to enforced detention, and both alike will be unable to secure compensation for loss of time and the derangement of their plans. Surely, if detention is necessary in the interests of the community, the individual should not suffer, and go quite unrequited.

To the other resolutions less exception may be taken. The medical examination of the inmates of common lodging-houses and casual wards and the disinfection of their clothes is no great hardship, and would certainly be productive of much good. The temporary closure of a common lodging-house in whole or in part, compensation to be given to the keeper of the house, and the power to order the keeper of a common lodging-house in which there has been infectious disease to refuse fresh admissions to the house for such time as may be required by the sanitary authority (presumably with compensation), are matters of undoubted importance ; and no injustice is done if fair compensation is awarded.

On the whole there is no reason to believe that, given the power to award fair compensation, sanitary authorities would meet with much difficulty in carrying out all the requirements to which the resolutions of the Conference sought to give expression.

The resolution, which seeks to make it an offence to withhold information or make false statements to the sanitary

authority in carrying out its powers with respect to small-pox, is unobjectionable, although it is doubtful if those who do not always tell the truth can be deterred from lying by Act of Parliament.

The supersession of defaulting sanitary authorities by county councils, the circulation of weekly returns of infectious disease by the Local Government Board, and the establishment of intelligence bureaux in groups of counties and county boroughs for the reception and dissemination of information as to the prevalence of infectious disease in the areas they serve, are matters which will command universal approval.

The establishment of labour colonies to which the magistrates could send habitual vagrants for their compulsory detention, until they have acquired self-restraint and power to work, was approved by the Conference, but no doubt much difference of opinion exists as to the desirability of setting up what are practically rival penal establishments to those existing under the criminal law.

It would clearly seem to be undesirable that labour colonies established primarily for the benefit of *bonâ fide* workmen out of employment, should be used as places of detention for habitual vagrants. It would be repugnant to men of good character to be forced to associate with men of the tramp type ; and such association would render the colonies unacceptable to those members of the working classes who are most deserving of assistance.

The Conference was also in favour of establishing labour bureaux in the areas of every county council and every county borough council. It is very doubtful, however, if such bureaux are of any practical use. When trade is brisk there is no demand for labour bureaux ; when trade is generally slack, the difficulty is not in bringing workmen into communication with employers, but in finding any work at all for the unemployed. Labour bureaux cannot create work ; and the only possible method of relieving the distress from want of employment is to create work, which the ordinary employers of labour owing to bad trade, are unable to supply.

FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

I.—ST. BARTHOLOMEW'S HOSPITAL.

HISTORY AND BUILDINGS.

[With Plates III.—XII.]

ST. BARTHOLOMEW'S HOSPITAL in West Smithfield stands near St. Paul's Cathedral on the very site where it was placed by Rahere in 1123, "in honore Exaltacionis Sancte Crucis," a fitting dedication at a time when the first Crusade was still a living memory. Rahere obtained the land from Henry I. by the influence of his friend and patron, Richard of Belesme, Bishop of London. Twenty years later the site was enlarged by grants from owners of the adjacent property in token of their appreciation of the charitable work undertaken by the hospital. The story of the conception of the hospital is well known, but it always bears re-telling, and it is easy to believe that it is not without truth. Rahere, a courtier though a cleric, "decreed himself to go to Rome to do the worthy fruits of penance, and our Lord God directing his pace came whole and sound whither he purposed, where at the martyrdoms of the blessed Apostles Peter and Paul, he, weeping his deeds and calling to mind the escapades of his youth and ignorance, prayed to our Lord for remission of them, promising further-more none like to do, but this utterly to forsake, promising ever devoutly to obey his will. And when he would perfect his way that he had begun he saw a vision full of dread and sweetness. It seemed him that he was borne up on high of a certain beast which set him in an high place, and when he from so great a highness would inflect and bow down his eye he beheld an horrible pit, and the deepness of the same pit was deeper than any man might attain to see. Therefore he, knowing his secret faults, deemed himself about to slide into that cruel downcast, and he for dread trembled and great cries proceeded out of his mouth. To whom dreading, and for dread crying appeared a certain man like in shape the majesty of a

king, of great beauty and imperial authority. Then, said he, ' I am Bartholomew,[1] the Apostle of Jesus Christ, that came to succour thee in thine anguish and to open to thee the secret mysteries of heaven. Know me truly by the will and commandment of the High Trinity and the common favour of the celestial court and council, to have chosen a place in the suburbs of London at Smithfield, where in my name thou shalt found a church, and it shall be the house of God : there shall be the tabernacle of the Lamb, the temple of the Holy Ghost. This spiritual house the Almighty God shall inhabit and hallow it and glorify it, and His eyes shall be open, His ears listening on this house night and day, that the asker in it shall receive, and the seeker shall find, and the ringer and knocker shall enter. Wherefore do thou boldly, neither of the costs of this building doubt thee nought, only give thy diligence and my part shall be to provide necessaries : direct ; build and end this work. And therefore of this work know me the master and thyself only the minister : use diligently thy service and I shall show my lordship.' In these words the vision vanished."

The story is a pretty one and surely there are few hospitals which can boast so heavenly a foundation, for Rahere established the hospital before he built the priory and ever the two great foundations remained distinct though allied, until at the

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[1] The appearance of Bartholomew rather than of one of the other Apostles is perhaps to be explained by the fact that Rahere had visited the church of St. Bartholomew, then newly-restored, which stands on the island of the Tiber at Rome, near the Capitol. The island (Fig. 1) once contained a temple to Æsculapius, and on the site of the temple is the church of S. Bartolommeo all' Isola, built in 997, restored in 1113, just before Rahere's visit, and modernised in 1625. The temple of Æsculapius was founded in 293 B.C., on the return from Epidaurus of the embassy sent to bring an eikon of Æsculapius to Rome to stay an outbreak of plague. When the ambassadors returned with a statue of the god a serpent was found to have hidden itself in the ship, and it was under this form that the god of medicine often showed himself. Arrived at Rome the snake left the ship, swam ashore, and hid itself amongst the reeds of the island. Here, therefore, the temple was built. The whole island was faced with travertine, and its form was reduced to the shape of a ship in memory of the event. Some remains of this curious work are still to be seen. They consist of part of the stern and the starboard side of a ship, with the damaged bust of the god in relief with his symbol, still in use amongst us, of a staff entwined by a serpent. An infirmary was attached to the temple of Æsculapius in ancient times, and on its site now is the hospital of S. Giovanni Calibita or dei Benfratelli, with 74 beds for male patients affected with acute disease. There is thus an easily traced connection between the father of medicine and St. Bartholomew's Hospital.

latter end the hospital has outlasted the monks. But it was no light task that was laid upon Rahere, and without a firm faith in Bartholomew he could never have carried it through. When Rahere got home, now an Augustinian Canon, men told him that the chosen site was a part of the King's market— Cloth Fair—" of the which it was not lawful to princes or other lords of their proper authority anything to minish, neither to so solemn a service to depute." In spite of this Rahere addressed himself to the king, " and the Bishop Richard being present, the which he had made favourable to himself beforehand, effectively expressed his business and meekly besought that he might lawfully bring his purpose to an end. And nigh him was He in whose Hand it was the king's heart to incline to what he would and ineffectual these prayers might not be whose author is the Apostle, whose gracious hearer was God. His word therefore was pleasant and acceptable in the king's eye, and he granted to the petition his kingly favour, benignly giving authority to execute his purpose. And he having the title of desired possession of the king's majesty was right glad. Then nothing he omitting, of care and diligence two works of pity began to make : one for the vow that he had made, another as to him by precept was enjoined. The church he made of comely stonework tablewise and an hospital house a little further off." One wonders if the recent loss of the White Ship and the drowning of the Atheling, after which Henry was never again seen to smile, had turned the king's heart towards works of religion and charity, and if to this catastrophe we owe the site of the hospital. The chosen site did not promise much, for "this place before the cleansing held forth no hope of goodness, right unclean it was, and like as a marsh dank and fenny, with water everywhere abounding. And what was eminent above the water dry, was deputed and ordained to the gibbet or gallows of thieves and to the torment of others that were condemned by judicial authority.' It is told, too, that our founder took part in preparing this vile place for his buildings much in the same way as, but with better success than, Prof. Ruskin built his road at Hincksey near Oxford, for " truly when Rayer had applied his study to the purgation of this place and decreed to put his hands to that holy building, he was not ignorant of Satan's wiles, for he made

and feigned himself unwise for he was so coated, and outwardly
pretended the cheer (mien) of an idiot, and began a little while
to hide the secretness of his soul and the more secretly he
wrought the more wisely he did his work.   Truly in playing-
wise and manner he drew to him the fellowship of children and
servants, assembling himself, as one of them and with their use
and help, stones and other things profitable to the building
lightly he gathered together." The tale is pathetic and is
instinct with the faith of the time, and though it does not
become us to enquire too closely into its literal accuracy the
main facts are undoubtedly correct.

From the beginning the hospital was founded for the relief
of the sick poor and was not a mere almshouse like so many of
the older hospitals in England.   It had an independent con-
stitution and a separate estate for a master, eight brethren and
four sisters, whilst the priory at first had a prior and thirteen
canons.   The prior, says Dr. Norman Moore, to whom we owe
so much of the history of the hospital, was, of course, a greater
person than the master of the hospital, and the canons more
dignified than the brethren ; but such was the popularity of
the hospital from its very beginning that its reputation and
income rapidly increased and freed it from all dependence upon
the priory.   The relation of the hospital to the priory was in
dispute for more than 250 years after its foundation.   It was
not until 1373 that the ordinance of Richard of Ely acknow-
ledged the dependence of the hospital on the priory to be
merely nominal, a conclusion which has had the happy effect
of preserving for the use of the sick poor of London a great
foundation which would otherwise have been diverted, like
those of the priory, from the service of religion and charity
to the treasury of King Henry VIII.

Nothing now remains of the original buildings, nor is it
possible to trace them even in outline.   They were in all
probability mere scattered wooden structures whitewashed and
of one storey, perhaps separated from each other by streets and
narrow lanes, but most likely grouped round a central hall.
We know that there was such a hall and that it had a large
fireplace in the centre, because Henry III. made a present to
the hospital on September 11, 1223, and again in 1224, in these
terms :—" The King to Engelard de Cicogny greeting.   We

PLATE III.

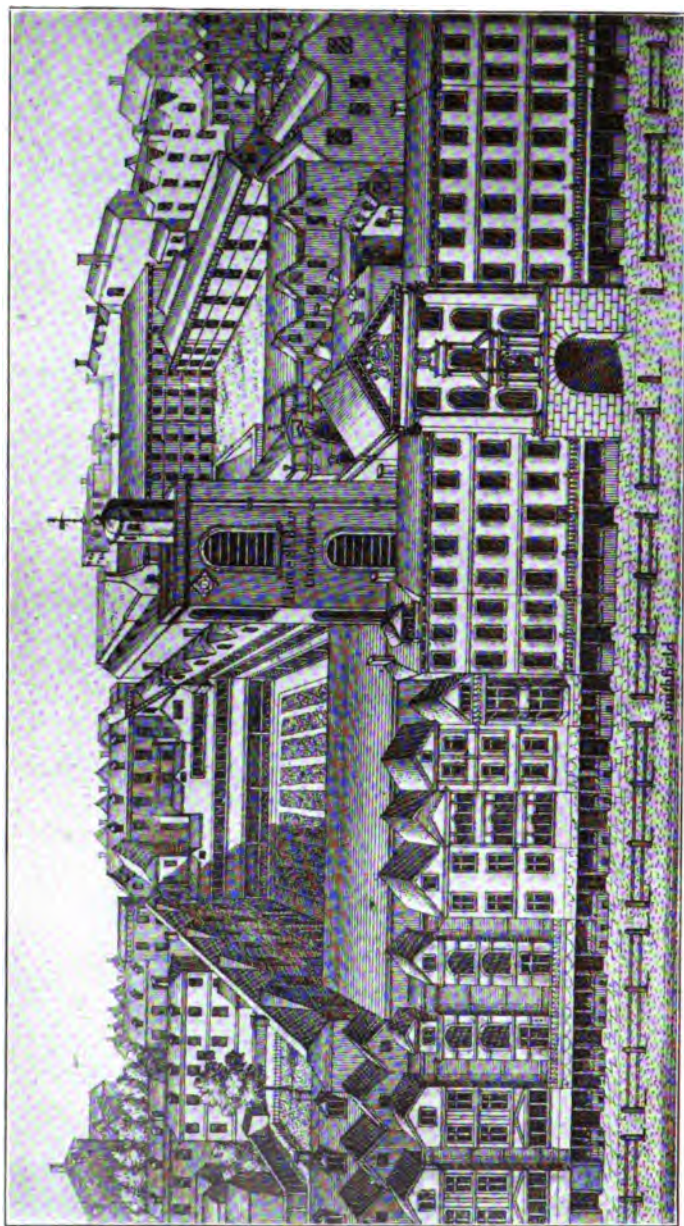Fig. 1.

Fig. 2.

PLATE IV.

Fig. 3.

command you to give to the patients of St. Bartholomew in London as our gift one old oak in our forest of Windsor, on the Thames, with the least possible injury to our forest and the greatest use to the aforesaid patients for their hearth."

There have always been entrances to the hospital where the gates at Smithfield (Fig. 2) and Little Britain now stand, and there used to be others. One was demolished when the new school buildings were erected, and for many years it was the principal entrance, as the Smithfield gateway was blocked to traffic. The principal gateway was rebuilt in 1702. It is of the Doric order and consists of a large arch over which is a statue of Henry VIII. placed between Corinthian pillars supporting a circular pediment adorned with two figures emblematical of sickness and lameness. Before the Reformation there were several chapels with lodgings for the chaplains, and the last of them, the tower of the original structure alone remaining, is known to us as the Parish Church (Figs. 2 and 10) of St. Bartholomew's the Less, though its proper name is Holy Cross. The other chapels were St. Catherine's, near the north corner of the Smithfield front, and St. Nicholas and St. Andrew on the south side, near the present outpatients' room.

Within the hospital, and remaining until a much later date, were houses with gardens. Dr. John Caius, who gave his name to Caius College, Cambridge, died, as he had predicted, on July 29, 1573, in one of these houses ; Master Vicary occupied another a few years before him ; and in 1567 Dr. Lopus, a physician, was resident officer. Between 1567 and 1575 there are various orders for repairing his house and gardens. On November 9, 1575, the hospital decided to "board his parlour" in consideration that he should be "more painfull in his care" for the poor. Vicary had received a livery of the hospital, but in lieu of it Dr. Lopus had forty shillings a year, which with his house and a certain allowance of "billetts and coales" formed his salary. This plan was interrupted for a time and Dr. Lopus lived away from the hospital, but on the retirement of his successor, Dr. Turner, it was again adopted, and Dr. Timothy Bright was elected to have the office of physician with the house and fee thereto belonging. This plan of having a resident physician was continued until 1599 or 1600, when Dr. Doyley, who was then physician, asked for £20 a year "according to the king's

foundacon and it was granted him on condition of his giving up the house he held." And with this £20 a year he received in commutation " for his fewell v li. and for his livery xl s." It does not appear that Dr. William Harvey ever received anything in lieu of a livery, and he certainly never resided as physician to the hospital, though the minutes of 1614 show that it was considered very desirable that he should do so. Thus on July 28, 1614, " It is thought meate by this Court that Mr. Dr. Harvey, or his successor, physician to this hospital, shall have the howses nowe or late in the tenures of Mris. Gardner and Dr. Bonham with a parcell of the garden now in the tenure of William Allen in Weste Smythfield, after the expiration of the lease sometyme granted to Robert Chidley, gent., which the said William Allen now holdeth. And the same then to be devided and laid forth at the discrecon of the governors of this howse, for so long a tyme as he shal be doctor to this howse, for such yearly rent and uppon such condicons as this Court shall thinck fytt." The Treasurer has been a resident officer of the hospital until quite recently, the clerk, the hospitaller, and the steward still have houses within the hospital gates, but their residences have long been shorn of any garden. The surgeons never appear to have lived in the hospital after its second foundation, but they were always enjoined to dwell in the immediate neighbourhood. This was construed to be the Old Bailey and Knightrider Street in the seventeenth century ; Charterhouse Square, Bedford Row, and even so far afield as Hanover Square in the eighteenth century. The charge delivered to the surgeons at the present time contains the clause:—" So long as you continue to be one of the surgeons to the hospital you shall reside within such reasonable distance there of as may be deemed satisfactory to the governors."

The older maps of London are too sketchy in their details to give even a general idea of the hospital and its buildings in the days of Elizabeth, nor are the woodcuts in Foxe's *Book of Martyrs* showing the burnings in Smithfield of greater assistance. It is not until 1720 that a separate engraving was made (Fig. 3). This shows the gateway as it stands at present with butchers' shops on either side. The gateway leads into a narrow lane, and the hospital buildings

PLATE V.

Fig. 4.

PLATE VI.

Fig. 5.

are built round quadrangles of three and four storeys high, one of which has an open gallery like the old inns. A few years after this engraving was made the hospital had outgrown its buildings, and it was necessary to rebuild it from the foundations between 1725 and 1760.

These buildings remain with certain alterations until the present day. They were begun in 1729 by James Gibbs, the architect of the church of St. Martin's-in-the-Fields in London, of the Radcliffe Camera at Oxford, and of the Fellows' Buildings at King's College, Cambridge. The buildings are grouped round a quadrangle (Fig. 4), and consist of four blocks, which were originally connected one with another by archways (Figs. 4 and 5). Each of the four blocks is four storeys high, and three of the four contain wards, the fourth being devoted to administrative offices (Fig. 6), the Great Hall, and the Treasurer's house. Each of the three ward blocks is entered by a plain archway leading to a great central staircase of wood. The wards are arranged in pairs on each floor running right and left of the staircase. The majority of the wards are divided longitudinally into two halves by a brick wall, access from one part of the ward to the other being only possible at either end. A sister's room, where she both lives and sleeps, opens out of the ward by a half glass door, and in every instance there is a small ward kitchen. The bath-rooms and lavatories built out at the end of each block are modern additions. A fifth ward block was built in the last century by the side of the old operating theatre. The staircase to the Great Hall was decorated by Hogarth, and Dr. Moore says that "surgeons will observe with interest the good Samaritan employing the method of treating a wound by pouring oil into it, while physicians will admire in the painting of the pool of Bethesda the accurate representation of the distribution of psoriasis in the well-rounded limbs of one patient, the contrast of hypertrophy and atrophy on the left of the picture, the gouty hand, the wasted figure with malignant disease of the liver, and the rickety infant. The walls in the Great Hall are inscribed with the names of benefactors to the hospital dating back to the sixteenth century, and contains many fine portraits of those who have served the hospital faithfully whether on the lay or the medical side.

The hospital has undergone a steady process of enlargement

ever since its foundation, and many names known to students
of the history of London are included in the list of its bene-
factors. At the Reformation the hospital was separated from
the priory in 1537, John Brereton, Doctor of Laws, being then
master. The revenues came into the possession of King Henry
VIII. on October 25, 1539, but as early as February 11, 1539,
the Mayor and Recorder of the City had petitioned that the
hospital might be given to the City, the petition reaching the
king about March 5, 1539. No answer was given to the
petition for five years when letters patent were issued on
June 23, 1544, creating a new Bartholomew's Hospital. This
corporation consisted of a master (a priest) and four chaplains,
to whom were given the site, buildings, and church of the old
hospital of St. Bartholomew's the Less, and all its goods, jewels,
and chattels, but without any other endowment. The new
hospital being called " the house of the poor in West Smith-
field." The master and chaplains proved themselves bad
managers, for they sold the property, despoiled the library, and
removed so much of the furniture as hardly to leave sufficient
accommodation for three patients. But in the meantime the
care of the sick poor had become a question of importance in
London, and the citizens again appealed to the Crown, who, for
the second time, granted letters patent dated April 26, 1547, for
the refounding of the hospital with an endowment of houses
and lands of the annual value of 500 marks on condition that
the citizens should raise annually a like sum to secure a total
revenue of 1,000 marks or £666 13s. 4d. The hospital and its
endowments being vested in the Lord Mayor, Commonalty, and
Citizens of London, because " of the miserable state of the
poore, aged, sick, low, and impotent people, as well men as
women, lying and going about begging in the common streets of
the said City of London and the suburbs of the same to the great
paine and sorrowe of the same poore, aged, sicke, and impotent
people, and to the great infection, hurt, and annoyance of His
Grace's loving subjects, which must of necessity goe and passe
by the same poore, sick, low, and impotent people being
infected with divers great and horrible sicknesses and diseases."

The Hospital of St. Bartholomew contained 100 beds at
the time of its second foundation, and it is said that they
were all allotted to surgical cases. Three surgeons were

PLATE VII.

Fig. 6.

Fig. 7.

PLATE VIII.

Fig. 8.

Fig. 9.

appointed as early as 1547, and it was not until some time
between 1561 and 1567 that the first physician was elected.
This only means, I think, that duly qualified practitioners were
appointed to serve the hospital, for the Barbers' Company
first, and afterwards the United Company of Barbers and
Surgeons, had the monopoly of licensing to practise in the City
of London and in the suburbs for seven miles round. The
College of Physicians, founded in 1518, was a new body, its
members were very few, and the citizens would know much
less about them than they did about the members of the
Barbers' Company whose quarrels they had often been called
upon to settle. In 1564 the physician had 8 out-patients
under his care; in 1670 he had 40, a number reduced to
25 in 1675, whilst in 1710 100 patients were allotted to
him; in 1715 150, and in 1749 200. In accordance with
the custom of the time the surgeons relegated some parts
of their duty to those who were looked upon as unqualified
practitioners. They did not operate to remove a stone nor
would they undertake to cure a hernia; there was a bone-
setter attached to the hospital and a curer of "scaldheads,"
who was sometimes a woman. The autocratic power of the
surgeons was gradually nibbled away by the physicians until,
even as late as 1745, the surgeons were prohibited from
prescribing any internal medicine for patients within the
hospital except "mercurial physick or purges." At first the
surgeons supplied at their own cost the materials for dressing
the wounds of the patients under their care, and it was not
until 1567 that mention is made of an apothecary whose duty
it was "to finde such medicines and drinckes as are adminis-
tered inwardely unto any of the poore. And the surgions to
find all stuffe, as plasters, ointments, pulteses, and such like
things for the poore as are to be ministered outwardly." The
work of the apothecary's shop (Fig. 7) has increased enor-
mously. It now employs a large staff of dispensers under
the able supervision of Mr. Moore, and as many as 1,000
prescriptions are made up in a single day for the use of the
out-patients alone.

We know but little of the nurses at the time of the
second foundation. The hundred patients were cared for by
a matron and 12 nurses. The matron in 1552 had supervision

" of the washers and nurses of this howse to see that they be alwaies well occupied and not idle." In 1652 she was charged " at such times as the sisters shall not be occupied about the poor ye shall set them to spinning or doing of some other manner of work that may avoid idleness and be profitable to the poor of this house." Of the sisters it is said, " Ye shall also faithfully and charitably serve and help the poor in all their griefs and diseases as well by keeping them sweet and clean, as in giving them their meats and drinks after the most honest and comfortable manner. Also ye shall use unto them good and honest talk, such as may comfort and amend them . . . . using yourselves unto them with all sobriety and discretion. And above all things see that ye avoyd, abhor, and detest scolding and drunkenesses, as most pestilent and filthy vices. Ye shall not be out of the woman's ward after the hour of seven of the clock in the night in the winter time, nor after nine of the clock at night in the summer time, except ye shall be appointed and commanded by the matron so to be for some great and speciall cause that shall concern the poor (as the present danger of death or extream sickness)." Up to about 35 years ago there was one sister and three nurses to each of the 28 wards, and the entire staff of women numbered less than 120, now there are 320 residing within the walls of the hospital under the charge of Miss Isla Stewart —the matron. How well they do their work and how helpful they are to the medical staff and the patients is known only to those whose duty and pleasure it is to work daily in harmony with them. A sister clad in blue is the head of each ward, she is assisted by a staff nurse and a staff probationer both wearing striped uniforms, but distinguished from each other by the fact that the first wears a blue belt and the second a white belt, beneath them are one or more probationers in grey.

A few facts remain about the early patients of the hospital and of the manner in which they were admitted. One of the first of whom there is a record is Adwyne, in the time of Henry II. (1154–1189). He lived at Dunwych, in Suffolk, which has long since been swallowed up by the sea. He " dwelt on the seaside and was so contracted that he might not use the free office of hand nor of foot, his legs were cleaving to the hinder part of his thighs, that he might

not go, and his hands turned backwards, nothing with them might he do, nor work. The extremities of his fingers were so rigorously contracted in the sinews that he could not put meat in his mouth. In this grievous sickness he passed his young age, and when he attained to man's age and not yet had the power of his limbs, yet since the fame of tokens and miracles of the blessed apostle (Bartholomew) came to him by relation of other men, he began to lift up his sorrowful soul into a better hope. And though health were in that time delayed, it was promised to come. Therefore for that he was far from that church, he gave shipmen for their hire, and by ship he was brought to the church[1] and put in the hospital of poor men. And there awhile of the alms of the said church was sustained. And he began in the meanwhile by the virtue of the apostle to take breath unto him and the desired health first with his hands though they were crooked he did make small works as distaffs and weights and other women's instruments, and furthermore by succession when other members used their natural might he followed in greater works, hewers of wood with axe and squarers of timber with chipping axe (adze) and not long after the craft of carpentry in the same church and in the city he exercised, as it had been taught him from his childhood, blessing God whose eyes be on them that dread him and upon them that hope on his mercy."

In later years it was the custom of the hospital to employ eight or ten beadles, who are charged daily to "separate and divide yourselves into sundry parts and liberties of the city, every man taking his several walk. And if in any of your walks ye shall happen to espy any person infected with any loathly grief or disease, which shall fortune to lie in any notable place of this city, to the annoyance and infection of passers-by and slander of this house, ye shall then give knowledge thereof unto the almoners of this hospital, that they may take such order therein as to them shall be thought meet. Ye shall also have a special eye and regard unto all such persons as have been cured and healed in this house that none of them counterfeit any grief or disease, neither beg within the city and liberties thereof. And if ye shall so fortune

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[1] He could have been brought up the Fleet river as far as the bottom of Hosier Lane opposite the hospital.

and find any so doing ye shall immediately commit him or them to some cage and give knowledge thereof to the governors of this house. Ye shall not haunt or frequent the company of any poor and beggarly persons (that is to say) to drink or eat with them in any victualling house or other place . . . . lest by occasion thereof ye should winck at them and so lewdly license them to begge . . . Also ye shall not suffer any sturdy or idle beggar or vagabond to beg or ask alms within this City of London or suburbs of the same, but ye shall forthwith, commit all such to ward and immediately signify the name and surname of him or them to the alderman of that ward where ye shall apprehend any such beggar, and also to the Lord Mayor, that execution may be done as the law in that case hath provided."

The hospital received general surgical cases in the time of Elizabeth very much as it did until 50 years ago, and, if we may believe contemporary writers, they were too often the direct outcome of quack practice. Master Gale says in 1562 :—" I did see in the two hospitals of London called St. Thomas' Hospital and St. Bartholomew's Hospital to the number of 300 and odd poor people that were diseased of sore legs, sore arms, feet and hands, with other parts of the bodies so sore affected that 120 of them could never be recovered without loss of a leg or an arm, a foot or a hand, fingers or toes, or else their limbs crooked so that they were either maimed or else undone for ever. All these were brought to this mischief by witches, by women, by counterfeit javils that took upon them to use the art not only by robbing them of their money, but of their limbs and perpetual health. And I, with certain others, diligently examining these poor people how they came by their grievous hurts and who were the chirurgions that looked unto them, and they confessed that they were either witches which did promise by charms to make them whole with herbs and such like things, or else some vagabond javil which runneth from one country to another promising them health only to deceive them of their money. This fault and crime of the undoing of the people were laid unto the chirurgions—I will not say by part of those who were at that time masters of the same hospitals—but it *was* said that carpenters, women, weavers, cobblers, and

tinkers did cure more people than the chirurgions. But what manner of cures they did I have told you before—such cures as all the world may wonder at ; yea, I say, such cures as maketh the devil in hell to dance for joy to see the poor members of Jesus Christ so miserably tormented."

This plague of quackery and its results in the form of amputation is confirmed by John Woodall, who, writing in 1639, bears testimony to the good work of the hospital in the following words :—" I affirm for a truth, that for the space of near 24 years I have been a surgeon in the hospital of St. Bartholomew's, where I have taken off and holpen to take off more than one hundred of legges and armes, besides very many hands, amongst all which not one of them all hath died in the time of their dismembering nor afterwards through the exceeding effusion of blood in the operations that ever I could gather or conceive, and furthermore I affirm that not above four of each twenty dismembered, but lived to have been healed and have been delivered whole out of the hospital notwithstanding whatsoever their diseases have been." A mortality of 20 per cent. In the year 1722 there were 3,381 admissions into St. Bartholomew's Hospital, " of whom 217 were buried after much charge in their illness."

When the plague was rampant and syphilis was a much more serious disease than it is at present some means of isolation were of the utmost importance. St. Bartholomew's Hospital, by the hand of Dr. William Harvey, declared in 1633 " that all such as are certified by the doctor uncurable and scandalous or infectious shall be put out of the said house or be sent to an outhouse, and in case of sudden inconvenience this to be done by the doctor or apothecary." These outhouses or isolation hospitals were situated in Kent Street, Southwark, " The Lock," for men (Fig. 8), and at Kingsland, " The Spital" (Fig. 9), for women. They were originally leper houses of very ancient foundation, hospitals which were once more numerous though less closely connected with St. Bartholomew's. The Lock and the Spital survived until 1760. Each contained about 30 beds and was under the charge of a " guide " or surgeon, who, in 1608, had an annual stipend of £4 a year, and fourpence a day for the diet of each patient under his care. In 1754 each surgeon had a salary of £30 a year besides a

house, and a gratuity of £50 a year for medicines. It was usual in later times for the two senior assistant surgeons to the hospital to be "surgeons and guides" of the Locks. The sacramental chalice, until lately used in the wards of the hospital, was formerly in use at the Lock in Southwark, and it is thus one of the last connecting links which binds the hospital to the even more venerable leper houses of London.

The Parish Church of St. Bartholomew's the Less (Fig. 10) is within the gates of the hospital, and was at one time called the chapel of Holy Cross, at another the chapel of the Brotherhood of St. Bartholomew, and contained a chapel for the poor. It was founded by Rahere, and the structure then standing escaped the Great Fire of London. With the exception of the tower this chapel was taken down because it had become ruinous, and was replaced in 1789 by an octagon building of wood designed by George Dance, architect and surveyor to the hospital. His wooden building was replaced by the present church of stone erected by Hardwicke in 1823. The tower was built at some time before 1300 and is thus the oldest part of the hospital building, it contains some Norman and Early English arches and pillars. The piscina (Fig. 11) from the ancient church now does duty as the font. In the ante-chapel are two brasses (Fig. 12) showing the figures of William Markeby, who died in 1439, and his wife Alice; in the north wall of the church is a monument to Ann, wife of Sir Thomas Bodley, founder of the Bodleian Library at Oxford. The tomb of Robert Balthrope, serjeant-surgeon to Queen Elizabeth (Fig. 13), is in the wall behind the organ, and the tomb of John Freke, surgeon (1729-1755), is interesting. It is of the perpendicular period, and Dr. Moore suggests that it may have belonged originally to John Wakeryng, master of the hospital from 1422-1466.

The earliest record of a medical school at St. Bartholomew's hospital is in 1662, when students used to attend the medical and surgical practice, their studies being assisted five years later by the formation of a library "for the use of the governors and young university scholars." In 1726 accommodation was provided for a museum of anatomical and chirurgical preparations placed under the charge of John Freke, then an assistant

PLATE IX.

Fig. 10.

Fig. 11.

Fig. 12.

PLATE X.

Fig. 13.

Fig. 14.

surgeon. Leave was granted in 1734 for any of the surgeons
or assistant surgeons "to read lectures in Anatomy in the
dissecting room of the hospital," a great step in advance, for
the Company of Barber Surgeons still held a monopoly of
anatomical teaching, and it was only by especial favour that
a licence for "private anatomies" could be obtained. The
first surgeon to avail himself of this permission was Edward
Nourse, whose course consisted of 23 lectures. These
anatomical lectures were delivered for many years, and
were followed in 1765 by lectures on surgery delivered by
Percivall Pott, who had been his pupil and prosector. These
lectures became so celebrated as to attract men from all
parts, and amongst others John Hunter. About the same time
Dr. William Pitcairn, and afterwards Dr. David Pitcairn, gave
lectures on Medicine, though the lectures were probably only
occasional. It was in one of these lectures that Dr. David
Pitcairn first pointed out the relation between cardiac disease
and acute rheumatism.

Further additions to the course of instruction were made
by John Abernethy, who established the principal lectures of
the present day in conjunction with Drs. William and David
Pitcairn. The governors of the hospital built a lecture
theatre in 1791, where Abernethy lectured with the greatest
success, having amongst his auditors at different times Benjamin
Brodie, William Lawrence, and the poet Shelley. So great,
indeed, was the attendance that a new and larger theatre
was built in 1822 (Fig. 14). At the same period Dr. William
Austin, physician to the hospital, delivered the first course of
lectures on Chemistry. The anatomical museum was consider-
ably enlarged in 1835 and 1854 ; new medical and chemical
theatres and museums of Materia Medica and Botany were
built, the library was enlarged, and in 1865 the dissecting
rooms were rebuilt. Various alterations and additions were
made to the school buildings until, in 1876, the increase in
the number of students rendered the existing accommodation
insufficient. The governors then decided to rebuild all the
school buildings, a design which was completed in 1881, when
the present block was opened by H.R.H. the President
of the Hospital, now His Majesty King Edward VII.—our
Patron. In the building is a fine library (Fig. 15) and a

museum (Fig. 16), which contains a magnificent collection of pathological specimens.

In 1843 the governors founded a college for the convenience of students who wished to live within the hospital. Its site was part of the gift to the hospital of Hersent, wife of Geoffrey of St. Loy, William FitzSabelline, and of John Bocointe. The Bocointes, or family of Bucca uncta, " oily mouth," were distinguished in Stephen's reign, and John's father, Andrew, was the leading citizen in 1137, when he was Justiciar of London, a position which gave him precedence even of the sheriff.

In 1877 an institution was established for training nurses in connection with the hospital, and in 1885 a complete convalescent home was opened at Swanley, in Kent, to accommodate 70 patients. The clinical practice of the hospital now comprises a service of 744 beds; of these, 231 are allotted to medical patients, 335 to surgical cases, 25 to diseases of the eye, 32 to diseases of women, and 50 to general and isolation cases. There are no separate wards for the diseases of children. During the year 1903 the number of in-patients under treatment was 7,264, and of out-patients 137,305, whilst 1,538 midwifery cases were treated at their own homes.

The hospital has several times renewed its youth by rebuilding its premises, and in each instance the renewal has been coincident with a time of great intellectual vigour. The twelfth century was remarkable for the Crusades, the building of the great cathedrals, the coming of the friars, and the growth of feudalism, it was the prelude to the Renaissance. Our hospital was built and grew most strongly during the middle of this period. The second foundation was the direct outcome of the Reformation, that peculiar movement which in a few years separated at once and for ever mediæval from modern England. The third rebuilding of the hospital came on the wave of philanthropy, which raised infirmaries in every county town throughout the kingdom, a tide whose origin and far-reaching effects have never yet been adequately discussed. The necessity for rebuilding has again arisen (Fig. 17) and must be faced by the present generation, a generation familiar with the advent of steam, of iron, and of electricity. As on all the former occasions, it must be gradual but it will be none

PLATE XI.

Fig. 15.

PLATE XII.

Fig. 16.

Fig. 17.

the less thorough. Money will come in but slowly, and as it comes so the work of rebuilding must be carried out. New out-patient rooms, accommodation for the special departments of medicine and surgery and pathological laboratories will be built first, for the King, Patron of the Hospital, has already laid the foundation-stone of this block on land obtained at a great price from Christ's Hospital. The wards must then be reconstructed, for enormous improvements have taken place in the construction of hospitals and public opinion demands, what the governors freely allow, that a determined effort be made to bring the buildings up to a modern standard. To do this, however, much money is required, and as in the eighteenth century money had to be obtained by public subscription, so in the twentieth century the hospital is again appealing for funds to rebuild on its ancient site. In the eighteenth century money came so slowly that more than thirty years passed before the buildings could be completed ; in the present day it pours in somewhat more rapidly, but in nothing like the full stream which is necessary to enable the hospital to proceed in its highest splendour.

(To be continued.)

Reviews of Books.

A Handbook of Ophthalmic Science and Practice. By HENRY
E. JULER, F.R.C.S., Ophthalmic Surgeon to St. Mary's
Hospital; Consulting Surgeon to the Royal Westminster
Ophthalmic Hospital; Consulting Ophthalmic Surgeon to
the London Lock Hospitals. Third Edition. Price 21*s.*
net. London: Smith, Elder & Co., 15, Waterloo Place.

WE have much pleasure in welcoming a third edition of
Mr. Juler's well-known handbook, which shows signs of the
most careful revision. We have turned up the subjects upon
which fresh investigations have been published since the last
edition appeared, and in nearly all we find that the latest
views or newest facts have been incorporated.

We will refer to a few of the additions, for to mention them
all would be a big undertaking. The various organisms which
have been found associated with the different clinical types of
conjunctivitis are described. We notice, however, an omission
in that no mention is made of Morax's diplo-bacillus, or of the
peculiar type of inflammation affecting so markedly the angles
of the lids, with which it is connected. Morax's name is
quoted in speaking of the bacillus described by Weeks, an
organism of quite a different character.

The concise description of Mooren's ulcer of the cornea,
a rare affection, to which much attention has recently been
paid, is very accurate and good.

The indications for the operations of enucleation, evisceration,
or one of their substitutes, which were drawn up by a committee
of the Ophthalmological Society appointed to investigate the
subject, have been inserted, and the improved artificial eye
of Snellen is described.

Haab's giant magnet, the sideroscope, and Mackenzie
Davidson's method of localising foreign bodies in the eye by
means of X-rays, are mentioned, and the latter fully gone into.

In the treatment of concomitant strabismus the methods
of training the fusion-power are discussed; Worth's amblyoscope
and its use being described.

The insertion, in the form of an appendix, of several plates

drawn by Mr. G. S. Keeling, illustrating in a semi-diagrammatic manner the pathological histology of the eye, is another new feature in this edition. Some of these have, we think, rather an unnatural appearance, for instance, in plate D it was a pity to omit the sheaths of the optic nerve, and in plate H, Figs. 2 and 3, the endothelium from the back of the cornea is continued on to the anterior surface of the iris in a remarkably precise way, notwithstanding the adhesion. We regret to find Mr. Juler still speaking of acute glaucoma as an inflammatory affection, seeing that it has been so clearly demonstrated that the redness and œdema which accompany it are solely the result of congestion from obstructed circulation.

This new edition, like its predecessors, will, we feel sure, be a very popular text-book amongst students.

Textbook of Diseases of the Eye. By HOWARD F. HANSELL, M.D., and WILLIAM M. SWEET, M.D. With chapters by Christian R. Holmes, Casey A. Wood, and Wendell Reber. 256 illustrations. 532 pages. London : Rebman, Limited.

YET another textbook has been added to the already overfull bookshelves of the ophthalmologist. The one we have now under review is *Textbook of Diseases of the Eye*, by Howard F. Hansell and William Sweet. They have had the additional advantage of the assistance of Christian Holmes, Casey Wood, and Wendell Reber, all of whom have contributed chapters on special subjects. The book consists of upwards of 500 pages, and it is well got up and profusely illustrated. The idea the authors have is to present to the student "the subject-matter tersely, practically, and comprehensively" ; and in order to do this, less space has been allotted to refraction and to diseases that do not prove amenable to treatment, and thus more room is left for the discussion of the more ordinary diseases that are met with. There are many things that authorities differ about, and the treatment recommended in some cases would not be universally acknowledged to be the best, but still in this respect things are fairly stated, and operations are described in a lucid manner. A good deal of attention is bestowed on the diseases of the eye consequent on infection, and several plates are given illustrating the appearance of the microörganisms that are found. The chapter

I

on colour-blindness might be improved upon. The unsatisfactory theories of Helmholtz and of Herring are given, while no reference is made to Edridge-Green's researches. A chapter on X-ray localisation is given at the end. The book is attractive in appearance, well written, and worthy to rank with the best of the somewhat similar books that are already in existence.

The Refraction of the Eye. A Manual for Students. By GUSTAVUS HARTRIDGE, F.R.C.S., Senior Surgeon to the Royal Westminster Ophthalmic Hospital ; Ophthalmic Surgeon and Lecturer on Ophthalmic Surgery to the Westminster Hospital, &c. With 105 illustrations. Price 6s. 12th Edition. London : J. and A. Churchill.

TO review a book which has reached its 12th edition, and of which 19,750 copies have been printed, may be considered a work of supererogation. A far higher verdict has been passed on its merits than can be bestowed upon it by any reviewer. A book which has met with such success has evidently supplied a want, and it may not be uninteresting to consider what influences have been at work during the last 20 years to create a demand for a fresh edition of it about every two years. First of all we may point out that it originally appeared at a time when a great improvement in the methods of estimating errors of refraction had taken place. The importance of retinoscopy was beginning to be realised, and all those taking up ophthalmic work were anxious to learn all they could about a method which enabled them to rely on their own observations rather than on the statements of patients,—that is to say, on an objective rather than a subjective method. Then the frequency, with which errors of refraction are the cause of headache and symptoms of asthenopia, has become much more generally recognised during the last 20 years, as also the importance of their correction for the treatment of strabismus and checking the progress of myopia. The want of a book, therefore, which was a reliable guide as to how to proceed to order suitable glasses for these several conditions, became a natural sequence. Much of the popularity of Mr. Hartridge's book is also undoubtedly due to the clear and precise way in which it is written. The present edition has been brought well up to date,

and promises to still hold its own against the numerous competitors which have recently appeared. We regret to see that an error is still perpetuated as to the required amount of vision of candidates for commissions in the army. It should be $\frac{6}{24}$, not $\frac{6}{36}$, with each eye separately without glasses.

A Practical Textbook of the Diseases of Women. By ARTHUR H. N. LEWERS, M.D., F.R.C.P., Senior Obstetric Physician to the London Hospital, &c. Crown 8vo. Pp. xviii and 533. Price 10s. 6d. London : H. K. Lewis.

THIS book is too well known already to need a detailed account of this, the sixth edition. The book has been thoroughly revised, a treatment which it badly needed, as in the last edition the extra-peritoneal method of performing hysterectomy was described. Drainage by Keith's tubes is no longer recommended, this procedure having been relegated to the realms of obsolete surgery. Special mention is made of cervical fibroids, an important group of cases presenting special features, and requiring a somewhat different operative procedure for their removal from that employed when these tumours are situated in the body of the uterus. Dr. Lewers' abilities as a teacher are well-known, and will continue, to be appreciated by a large class of students.

A Short Practice of Gynæcology. By HENRY JELLETT, B.A., M.D., B.CH., B.A.O. (Dublin University F.R.C.P., I. and M.), Ex-Assistant Master Rotunda Hospital, Dublin. Second Edition. Pp. 398, with 223 illustrations. London : J. and A. Churchill. Price 10s. 6d.

THE first edition of Dr. Jellett's work was presented to the medical public only three years ago, and that a second edition has already been called for clearly indicates its popularity. Revision, enlargement, improvement, are all characteristics of the second edition.

Amongst the new illustrations we note particularly those borrowed from the well-known works of Cullen and Hubert Roberts. All the principal gynæcological operations are well described and abundantly illustrated. The author's method of preparing sterile catgut is specially commendable, and will

prevent this valuable material from falling into disuse. The author's catgut steriliser can also be used for treating tents with superheated alcohol. The subject of dysmenorrhœa has been somewhat summarily disposed of in a couple of pages ; we shall hope to see fuller justice done to this subject in the next edition. This book is well worth the careful attention or students and practitioners.

L'Arthritis. By GUYOT. Preface by Besnier. Paris : G. Steinheil, 2, Rue Casimir-Delavigne.

THE full title of this book will give a clearer idea of its aims.

"Arthritis, with its various manifestations—rheumatism, gout, diabetes, arterio-sclerosis, neurasthenia, nervous affections, asthma, calculus formation, &c.—is a general disease, microbic and transmissible. The prophylaxis and the treatment."

It is a title the boldness of which is calculated to startle the most adventurous thinker, and to the English reader the prominence given to arthritis will seem curious and hardly scientific. The book is, however, well worth perusal. We have no hesitation in saying that the reader, though he may not agree with the author, and though he may object that his theory has outstripped his facts, will not only be interested, but will also get a considerable insight into the character of some of the French writings upon these subjects, which have been among the most brilliant and suggestive.

The first chapter deals with diabetes, considered as a symptom of many infections, and interesting cases bearing on contagion in diabetes are recorded, together with an account of some of the pathological lesions in the pancreas that were found in some fatal cases.

The second chapter is upon the identity of rheumatism and gout. The writer quotes an interesting remark of Senac on the question of urate of soda in gout to the effect that when one comes to study gout, we forget everything except the existence of a few crystals of uric acid on a thread. Guyot assumes microbic influences in gout.

The bacteriology of acute rheumatism is outlined, but unfortunately with the omission of most of the English work.

The third chapter is devoted to arterio-sclerosis, and the fourth to nervous affections.

In the last chapter Guyot discusses prophylaxis and treatment. He emphasises the importance of infections from the mouth. The drugs to which he devotes especial attention are the iodides, cacodylate of sodium, and the colloidal silver salts.

This book gives the reader a sketch of all the diseases enumerated in the title, viewed from the standpoint of infection, and thus is of assistance in enabling him to see the weak and unproved points in the theory.

Squint occurring in Children. An Essay by EDGAR A. BROWNE, F.R.C.S.E., Lecturer on Ophthalmology, University, Liverpool. Assisted by EDGAR STEVENSON, M.D., M.CH. (Aberdeen), Demonstrator of Ophthalmology, University, Liverpool. 71 pages, 5 illustrations. London : Bailliere, Tindall and Cox.

A SMALL book on " Squint occurring in Children," by Edgar A. Browne and Edgar Stevenson, is an essay representing the teaching of Mr. Browne for some years past, and is, he says, an expansion of an address delivered before the Medical Society of Liverpool in 1902. It treats only of concomitant convergent squint in childhood, and he regards it as an account of squint reduced to its simplest expression. In reading through the essay one is certainly struck by its simplicity, and if squint itself is such a very simple matter, as the author seems to think, there is not very much to learn. Personally we do not think that the value of the book is great, for there is but little in it that is not known to most junior students, and could as well, if not better, be arrived at by looking the matter up in a text-book. Appendix II., consisting of the after-history of squints treated without operation, is the only part written by Dr. Stevenson, and this consists of four pages only.

Notes by the Way.

WITH the issue of this number dawns the
January, 1905. commencement of a new year, and we take
the opportunity of thanking our subscribers
for the confidence that they have hitherto reposed in us and of
wishing them a very happy and prosperous new year. Arrange-
ments for the coming year have been made which will, we
trust, have the effect of increasing the interest of our subscribers
and of presenting to them new and important features in every
issue of the Journal. We would bespeak the special attention
of our readers to a column headed " Competitions," which, we
feel confident, will commend itself to all, and which will speak
for itself.

For the last few years we have, as opportunity afforded,
published a special number in which articles, by some of our
leading practitioners, upon specific subjects of absorbing
interest, have appeared. These articles have attracted con-
siderable attention, and have been the means of disseminating
the latest views and information on the subjects of which they
have treated. As most of our readers will remember, these
special numbers have referred to such subjects as Typhoid
Fever, Syphilis, Tuberculosis, Cancer, and Gout. In order to
make these special numbers of paramount interest, we now
propose to enlist the co-operation of our readers by asking
them to name a subject, capable of being treated from various
points of view, upon which they would like to hear the views
of their colleagues in the profession. With this end in view,
we invite suggestions from our readers as to any particular
subject which they would like to see discussed in our columns.
We, therefore, ask them to be good enough to send, during the
current month, a post card addressed to the Editor of THE
PRACTITIONER, 149, Strand, W.C., stating the subject they
would like to see specially referred to, and we will undertake
that the subject which commends itself to the majority of our
readers shall be treated in a special number. At the same
time we take the opportunity of announcing that we propose

to publish a special number shortly on a subject of very general interest.

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Physical Education. AT a recent conference, called to consider the possibility of establishing for England a national or central school for physical education on the lines of " The Royal Central Institute " of Sweden, Miss Theodora Johnson, in describing the scheme, maintained that it had become imperative to organise physical education. On the proposition of Sir William Church, who was supported by Sir Lauder Brunton and Sir William Broadbent, it was resolved " That this Conference is of opinion that steps should be taken towards the establishment, in the United Kingdom, of a national system of physical education ; and forms itself into an Association to press proposals to that effect on the Government and public bodies." Lord Londonderry, whose efforts on behalf of boys' brigades, cadet corps, and similar organisations are well known, maintained that it was necessary to the health of the rising generation that such a system of physical education should occupy a prominent place in their minds. The committee, which had been sitting for some months, considering the deterioration of the health of the rising generation of this country, had issued its report, from which it appeared that they were of opinion that it was necessary to take steps to bring physical education within the grasp of each individual child in this country. We are glad to know that the Board of Education is fully alive to the necessity of introducing in all our public schools some system suited to the needs of English boys and girls. There is no doubt that the Swedish system has many merits, especially in Sweden, and that the Danish system is altogether excellent in Denmark, but what we want to see is a British system growing out of the British character and suited to British needs. This will be best accomplished by the good sense and patriotism of our county councils and schoolmasters, stimulated by the publicly expressed opinion of the highest medical authorities.

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WITH reference to the cause and infectivity
The Bradshaw Lecture on the Treatment of Cancer. of cancer, Mr. Mayo Robson said that of the true cause we really know nothing, and that our present knowledge did not warrant such a positive statement as that which had been made that from the histological character, method of growth, and absence of specific symptomatology it is not permissible to seek for the causative factor of cancer outside the life processes of the cells. We cannot assume that the cause is non-parasitic. Because no parasite has as yet been discovered, it is not true science to say that the quest for it is hopeless. The field is still open to the patient student of research. For the present for the treatment of cancer we are still dependent upon the aid of the surgeon. Whatever therapeutical discoveries the future may bring, it must be admitted that, as yet, no form of drug treatment, inoculation, or serum therapy has been found to possess any substantial value. Experience has proved the worthlessness of the serum treatment now being employed and advocated by certain so-called cancer specialists.

There are, however, certain precancerous conditions which can be readily recognised, especially in the tongue, lips, larynx, uterus and the skin, which strongly suggest that cancer is a new implantation on a prepared ground, and it must be the primary duty of the surgeon to recognise these "precancerous" lesions, and promptly excise them. There is no doubt that the sooner such an operation is performed the greater the hope that further mischief will not follow. We do not understand that conditions, which are described as precancerous are always necessarily followed by cancer, but Mr. Robson expresses a hope that practitioners, who have the chance of seeing patients in the early stage of their illness, will be convinced that in many cases cancer can be prevented by treatment in the precancerous stage, and that even when cancer has developed, if it can be seen early and thoroughly removed, it is frequently a curable disease. He also expresses a further hope that the public will be convinced that until a true prophylactic for cancer is discovered they will seek advice at the earliest possible moment, and so by securing treatment in the early

stages of the disease they may never hear the unwelcome verdict of too late now too often repeated.

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Tramps and Aliens. IN another part of this issue Dr. Louis Parkes calls attention to the dissemination of small-pox by tramps and workpeople, who, from various causes, travel about in search of work. That local authorities, under the advice of their medical officers of health, should be armed with stronger legal powers in the direction of preventive measures, goes without saying. At the same time, we would point out that a nuisance, equally great, is assuming unpleasantly large proportions, through the immigration of aliens. Many of these are suffering from a highly contagious form of ophthalmia, and it was observed the other day that out of 160 new patients treated at one of the Ophthalmic London Hospitals, no less than 102 were aliens. These undesirable guests, on landing, rush to our hospitals, which are supported by the voluntary contributions of all classes for the benefit of their suffering countrymen, and elbow out those for whose welfare such institutions have been established.

To step thus into the place of our own suffering poor is bad enough, but it is infinitely worse that these creatures should be the means of spreading abroad in crowded districts such a highly contagious disease.

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Sir Frederick Treves on Medical Scientists. IN proposing the toast of the Medical School at the University of Birmingham the other day Sir Frederick Treves remarked that the one thing which stood in front of all others in the advance of the country and the education of the people was applied science. It was very much to be regretted how very little heed was given to science in this country. There was a time when the man of science—Galileo, for example—was cast into prison ; now he was simply allowed to starve. There was no kind of encouragement offered to science. In every University throughout the country the same story was told. He thought that those men who devoted themselves to science in this country deserved rewards infinitely beyond any they had

ever received.   Speaking from the point of view of the science of medicine, the public had no conception, if he must use the expression, of what they got for their money.   We were told that millions were subscribed every year for charitable purposes in connection with the great hospitals, and it was a very noble and splendid fact, for which one could not express gratitude enough ; but it should be remembered that all the great advances in medicine and surgery with which the last 50 years had been marked had been carried out in voluntary hospitals by men who had worked for nothing, who had had positively nothing to gain, and who, on making a discovery, or securing an advance in a certain department of science, had made a present of it to the entire world.

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Dr. Ole Bull's Drawings.   DR. BULL, the eminent ophthalmic surgeon, of Christiania, has recently presented to the University of Cambridge 372 highly-finished drawings, which are intended to illustrate diseases of the eye and ear.   These drawings have been made from cases met with in both hospital and private practice during the last 36 years, and represent the various forms of disease with minuteness and accuracy of detail.   Each disease is illustrated by drawings of a series of cases which should convey to the student the clearest idea of the most prevalent forms and variations it may assume.   Dr. Bull is an accomplished draughtsman, and presents to students and others such perfection of detail as is only possible to an artist who is also a specialist.   By a special grace of the Senate, Dr. Bull has received the thanks of the University, and we feel sure that he will also receive the grateful thanks of all who may have an opportunity of studying his drawings.

Novelties and Notices.

THE ALLENBURYS' MILK-FOOD COCOA.

(Messrs. Allen and Hanburys, Ltd., London.)

This preparation is a combination of "Allenburys'" Milk Food with pure Cocoa. It is an ideal and pleasant beverage for invalids, who are often unable to digest the ordinary cocoas. One great advantage of this preparation is that it is quickly and easily made.

CHOCOLATES AND COCOA.

(Messrs Cadbury, Bourneville, Birmingham.)

We have received from this well-known Birmingham firm several samples of their Milk Chocolate, Chocolate Biscuits, Mixed Chocolates, Cocoa Essence, and Mexican Chocolate. Any special commendation by us would be superfluous, having regard to the popularity which Messrs. Cadbury's preparations have justly secured.

PLASMON OATS.

(International Plasmon, Limited, 66A, Farringdon Street, London, E.C.)

This preparation consists of the best Scotch oats combined with plasmon, which obviously must increase the amount of proteid present. A large proportion of the husk of the oats has been removed. This digestible and economical porridge is easily and rapidly prepared, and affords a very pleasant food.

A NEW SOLOID.

(Messrs. Burroughs Wellcome & Co., Snow Hill, E.C.)

Messrs. Burroughs Wellcome & Co. send us a soloid containing Hemisine, a derivative of the suprarenal gland, sodium chloride, and eucaine hydrochloride. One of these

dissolved in 3½ ozs. of water yields a useful local anæsthetic and hæmostatic, which may be applied to mucous membranes, or it may be used hypodermically.

NEW TABLOIDS.

(Messrs. Burroughs Wellcome & Co., Snow Hill, E.C.)

We have also received from Messrs. Burroughs Wellcome & Co. two new preparations in tabloid form. One of these is called Reduced Iron Compound, and contains Ferrum Redactum, Ext. Hyoscyami, Ext. Nucis Vomicæ and Oleum Carni. Each bottle contains 25 or 100.

The other is Donovan's solution, one tabloid represents 5 minims, which may be readily dissolved in water. It thus affords a convenient method of ensuring the regular use of the drug, for the tabloids are easily carried in the pocket.

BANANA OATS AND BANANA EXCEL COCOA.

(Messrs. M. H. Pattinson and Son, 2, Lullington Road, Anerley, London.)

Messrs. Pattinson and Sons have sent us these two preparations, the former of which may be used either for making a very digestible porridge, and is recommended for those who suffer from chronic dyspepsia, or for making banana oat cake, the latter, if properly made, may be readily stocked in an air-tight biscuit tin.

The banana excel cocoa is guaranteed to be absolutely pure, and has been made without the aid of chemicals ; this in itself is a recommendation.

BANANINA.

(The Banana Food Company, 46, Artillery Lane, Bishopsgate, E.C., and at Gibara, Cuba.)

This is a food prepared from the banana, most of the fibre having been extracted. No ingredients have been added. It contains 81·6 per cent. of carbo-hydrates, 3·5 per cent. of proteids, 1·1 per cent. of fats, and 1·8 per cent. of salts. The food is made with milk and water, and may be given to infants, invalids, and aged persons.

Practical Notes.

INFLUENZA.—There are four clinical types of this disease.
1. The respiratory type—in which the symptoms are mainly
those of acute coryza and bronchitis with a special tendency to
pneumonia, chiefly of the catarrhal type. The bacillus de-
scribed by Pfeiffer and known as the influenza bacillus is found
in the nasal and bronchial excretions. 2. The cerebrospinal
type. The symptoms are severe headache, pains in the back and
limbs, with much prostration, and even delirium ; there may be
irregularity of the heart, tachycardia or bradycardia. Children
are liable to acute meningitis with convulsions. 3. The gastro-
intestinal type—the chief symptoms being those of acute
gastrointestinal catarrh—namely, nausea, vomiting, abdominal
pain with occasional jaundice and diarrhœa, with collapse.
4. The febrile type. There may be no other special symptoms
except the general feeling of malaise, frontal headache and
prostration, with the temperature varying from 100° F. to
104° F.

The most important thing to keep in mind in the treatment
of influenza is to guard against the severe complications which
so often arise. Amongst the more important of these must be
remembered pneumonia, pleurisy, endocarditis, and pericarditis,
acute nephritis, optic neuritis, cerebral abscess, otitis media and
otitis interna. With this in view the patient must be confined
to bed until the temperature has been normal for two days at
least, saline purges administered, and much hot lemonade given
to drink. Supporting treatment is indicated, and the patient
should be fed upon milk and eggs. At night Pulvis Ipecacuanhæ
co. gr. x. may be given. For the headache and pains in the
limbs antipyrin gr. iii. is useful. Quinine is one of the best
drugs to prescribe and may be given as follows :— "From 1 to 3
grains, dissolved in 10 to 20 grains of citric acid, should be
added to a mixture containing a sufficiency of ammonium
carbonate and potassium bicarbonate to rather more than
neutralise the citric acid. This dose should be given every
three or four hours." For the cerebrospinal type of the disease
we advise bromides with which may be combined chloral. To

enable the patient to thin and expel the tenacious bronchial secretion the following is suggested :—

℞. Ammonii chloridi - - - - gr. x.
Ammonii carbonatis - - - gr. v.
Sodii bicarbonatis - - - - gr. v.
Tincturæ senegæ - - - ℥ ss.
Vini ipecacuanhæ - - - - ♏ v.
Aquæ chloroformi - - ad. ℥ j.
Ft. mist.

The above dose may be advantageously given with a table-spoonful of hot water three times daily.

The patients must be isolated as far as possible and old persons and those with phthisis especially guarded against infection. Handkerchiefs used during the coryza should be well boiled, and the tenacious bronchial secretion, which is expectorated, should be burned.

WHOOPING COUGH.—The remedial treatment of this disease, according to the teaching of Dr. Burney Yeo, is threefold :—

1. Antiseptic—so as to exert an antiseptic influence over the bacillus, which is found in the air-passages and in the sputum, which is probably the specific organism. With this in view, carbolic-acid inhalations, 5 per cent. solution, may be repeated three times daily, or quinine sulphate in small doses may be given internally (a child one year old may have 1 grain three times a day).

2. Anticatarrhal—the following formula will be found useful in allaying the catarrh :—

℞. Sodii benzoatis - - - 72 grains.
Sodii bicarbonatis - - - 48 „
Ammonii chloridi - - - 24 „
Aquæ chloroformi - - - 1 oz.
Aquæ anisi - - ad. 3 „
M. f. mist.

One to four teaspoonsful, according to the age of the child, in a little hot milk, every four hours.

Should the expectoration still be very tenacious, potassium iodide, in ½-grain doses, may be added to the above mixture.

Or the following prescription may be found useful :—

℞. Vini ipecac. - - - ℥ v.
Syrupi scillæ - - - ℥ x.
Aquæ anisi - - - ad. ℥ i.

To be given to a child every four hours.

3. Sedative. This treatment is directed to controlling the paroxysms in this disease, and to allay the nocturnal restlessness :—

℞. Morphinæ hydrochloridi - - ¼ grain.
Sodii bromidi - - - 30 grains.
Aquæ laurocerasi - - - 2 drams.
Aquæ-chloroformi - - ad. 1½ ozs.
M. f. mist.

One to three teaspoonsful for a dose, according to the age of the child.

But if there is much bronchial catarrh, the morphia must be omitted and chloral hydrate substituted.

Many sequelæ are apt to follow whooping cough. Amongst the more important of these are broncho-pneumonia, tuberculous disease of the lungs, so that during convalescence the child must be very carefully nursed, and exposure to cold avoided.

The patients should be isolated, and kept away from other children, for at least five weeks. During this period thorough disinfection should be carried out. The room in which the patient is must be well ventilated.

COMPETITIONS.

WE propose to offer to our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

A.—The Subject of the Essay for January will be

The Treatment of Diphtheria.

B.—Answers to the following questions are invited:—

1. What are the various causes of acute epigastric pain ?

2. A. B., male, aged 40, who had resided abroad for the five years immediately preceding, was admitted into the hospital suffering from a constant pain in the right hypochondrium, which had lasted for the past nine months. The pain was of a dull aching character, and was referred to the right shoulder. He stated he was unable to lie on his left side because of the dragging pain in the right. There was dyspnœa, which was increased upon exertion. The previous history was unimportant. On examination it was found that his liver appeared to be enlarged upwards and downwards, and there was a definite rounded mass in the right hypochondrium. The base of the right lung appeared to have collapsed, and there was about both ankles marked œdema, which spread gradually up the legs. There was ascites. The heart appeared to be normal, though the pulmonary second sound was accentuated. The blood-count was normal. The temperature remained between 98·4° F. and 99° F. After some slight exertion in the ward the patient was suddenly seized in the right side with severe pain, which rapidly increased ; there was now marked dyspnœa. The heart-beat was rapid, the cyanosis increased, and the patient died.

What was found in autopsy to account for these symptoms, and for such a sudden death ?

3. A labourer, 25 years of age, fell from a scaffolding 20 feet on to the right side of his head, and was rendered unconscious. He was brought to the hospital and examined. A large hæmatoma was found behind the right ear. Consciousness gradually returned, but it was found that he was paralysed down the left side, though he could slightly raise his left leg. He had complete motor aphasia. It was ascertained that he was a "right-handed" man. What morbid condition would account for these symptoms ?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner " Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of February, 1905. No Essay must contain more than two thousand words, and the Editor reserves the right to publish any Essay, which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions, must be marked on the top left-hand corner " Questions," and must be sent to the Editor on or before the 1st day of February, 1905.

A and B.—(1) One side of the paper only must be written on.

(2) The name or pseudonym and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

INTERLOBAR EMPYEMA.

By SIR WILLIAM BROADBENT, Bart., K.C.V.O., M.D., F.R.S.,

*Physician in Ordinary to His Majesty the King and the Prince of Wales;
Consulting Physician, St. Mary's Hospital.*

A FORM of empyema which has not received adequate atten-
tion is where an accumulation of pus is imprisoned in the
fissure between the lobes of the lung. It receives only a brief
mention in Dr. West's excellent treatise on diseases of the
lungs, in which it is said to be difficult of diagnosis, and I am
not aware that it has received much notice in any work.

I have seen several cases in which I have formed the
opinion that this condition existed, but only two in which the
opportunity has been afforded of verifying the diagnosis by
operation. I did not meet with an example in the post-
mortem room during my active connection with St. Mary's
Hospital, but before proving fatal an empyema in the inter-
lobar fissure would probably make its way into the general
pleural cavity. Possibly interlobar empyema will be found to
be more frequent than is apparent at present when attention
has been called to the condition and it is carefully sought for,
as has happened in so many other forms of disease.

In one case in which I came to the conclusion that there
was empyema between the upper and lower lobe of the left
lung, the pus made its way to the surface above and just out-
side the mamma, and the patient made a good recovery. In
another, on the right side there was sudden purulent effusion
into the pleural cavity, and the usual operation was performed.
I was not present, and had not the opportunity of watching
the case afterwards. In several the pus has burst into a
bronchus. It will be seen, on reflection, that this last mode of
termination is not an unlikely one. It may almost indeed
be inferred that when an empyema is discharged through a
bronchus, without the occurrence of pneumo-thorax, it has been

localised in the fissure. As fluid accumulates in the pleural cavity the lung shrinks and retreats before it, first from the removal of the negative pressure, later from the actual pressure of the fluid, till ultimately it is flattened around its root against the mediastinum. It is difficult to see how the fluid could gain access to a bronchus under this condition. Adhesions, however, or solidification might prevent the collapse of the lung, or the perforation may take place from within outwards, from a cavity, or by a process of ulceration, but the aperture which allowed the exit of the pus would probably permit of entry of air giving rise to pyo-pneumo-thorax.

When the pus is imprisoned between the lobes of the lung, as it accumulates it will tend to split the fissure in the direction of the root of the lung, where it would obtain ready access to the primary divisions of the main bronchus.

One of the cases in which the pus was evacuated by operation I watched with Dr. Hector Mackenzie. It was that of a gentleman, nearing the age of 60, tall, muscular, and rather stout. He had had an attack of influenza, attended with some inflammatory affection of an indefinite character of the right lung. He recovered, but some weeks later had a relapse, with return of trouble in the right lung. Very soon the general symptoms pointed to empyema, but there was no such dulness on percussion over the lower part of the chest as to indicate the presence of fluid, and exploratory aspiration, which had been practised at different points during my absence from town, gave negative results. The evidence on which the diagnosis was ultimately arrived at was that the physical signs, slight impairment of resonance and imperfect entry of air, varied from day to day, and, more particularly, that they shifted from the upper to the lower lobe and back from the lower to the upper in a remarkable way. It was inferred that there was probably an empyema between the lobes which pressed upwards or downwards, according to the position in which the patient lay. Careful search was therefore made along the course of the two fissures between the middle and upper and the middle and lower lobes, but no definite dulness could be made out. Dulness was, however, found behind above the spine of the scapula, and from this spot towards the axilla. At length the dulness could be recognised near the apex of the

axilla by Dr. Hector Mackenzie and myself, and Mr. Makins was asked to operate. A trocar was passed upwards and inwards, with a slight direction backwards at the point where dulness was present near the apex of the axilla; pus was found, and Mr. Makins resected a piece of rib—no easy matter in this situation—more than half a pint of pus escaped, and a tube was introduced. The progress of the case was extremely good. The drainage tube was extruded with unusual rapidity, and somewhat to our alarm, as the prospect of having to go in search of pus left behind in the recesses of a deep axilla was formidable. The explanation, however, was that the abscess cavity, having permeable lung above and below, was speedily obliterated.

The other case I saw with my old pupil and friend, Dr. Liston, of Tewkesbury, and I will let him tell the story of the case in his own words.

C. T., schoolboy, æt. 10.

First seen, December 21st, 1902, with rigors and high temperature. Well-marked signs of croupous pneumonia in left lung on 22nd.

History of influenza at school commencing a fortnight before, and apparent recovery.

The pneumonia invaded the left base first and gradually spread to the apex; there was a crisis on *the ninth day. Temperature remained normal for one day only, and then assumed a suppuration type. The physical signs now began to vary in a capricious manner from day to day as regards auscultation, but there was a steady displacement of the heart to the right.

Three attempts at aspiration were made without result, one in the left 8th interspace in the anterior axillary line, one in the mid-axilla, and one just below the inferior angle of the scapula.

The first attempt was made on December 26th, on which day there was absolute dulness of the whole left base up to the angle of the scapula, complete absence of vocal fremitus and marked œgophony. The puncture was made with a medium-sized trocar of Potain's aspirator just below the angle of scapula.

As the very marked displacement of the heart continued,

with great dyspnœa and suppuration chart, two further punctures were made on January 10th, both in the 8th interspace, one in anterior axillary line, the other in mid-axilla. Nothing was drawn off. On the 11th a marked area of resonance was noticed in the left base, especially in front, and the left apex was absolutely dull, with no breath sounds or vocal fremitus or resonance down to the 4th rib.

Sir W. Broadbent saw the patient on the 13th.

Under his direction an exploratory puncture was made high up, the trocar entering the thorax in the anterior axillary line just below the lower border of the pectoralis major, with the arm held out at right angles to the body. Pus was immediately struck, and about 1 pint there and then drawn off; an incision was made in the site of the puncture, and a short large tube inserted. The chart remained one of suppuration until the 26th, when the tube was removed, the sinus dilated with sinus forceps, and a huge collection of sloughs removed ; a tube of larger calibre was then inserted.

The temperature now remained normal until the night of February 11th, when the tube was out and could not be returned, and the temperature was 102·4. An anæsthetic was administered, the opening again enlarged, and tube re-inserted. The temperature came down to normal and remained so.

On March 11th the tube was discontinued as the discharge was clear glairy fluid, and patient's recovery was uneventful. He was out on April 14th.

His physical signs are now (July) practically normal, his entry of air being good all over, and his heart area normal in extent and position.

The fluctuations in the auscultatory physical signs mentioned by Dr. Liston, when carefully gone into, had a sufficient resemblance to those described in the first case to warrant the conclusion that there was fluid in the fissure exercising pressure upward and downwards. Finally, the amount was so large that both upper and lower lobes were consolidated by compression.

A SLIPPING CARTILAGE IN THE KNEE-JOINT.

By EDMUND OWEN, F.R.C.S.,

Consulting Surgeon to St. Mary's Hospital, London.

AT the recent examination for the M.B., B.S. Degrees of the University of London the following question was set in the Surgery paper :—

> Describe the symptoms and treatment of injury to the semilunar fibro-cartilages of the knee.
> What varieties of this injury have been found ?

And as I read the answers the impression was forced upon me that some of the candidates approached the operative part of the treatment in a somewhat light-hearted, or even casual manner.—If after a fair trial of palliative measures the trouble still persisted, the joint was to be opened and the internal semilunar fibro-cartilage was to be excised. That was all. That this cartilage was now found to be an antiquated sort of structure, somewhat after the style of the urachus, and the appendix, the gall-bladder, and (may I say it ?) the large intestine, and that the individual was far happier without it.

Most of the candidates, however, did realise the fact that the operation was, somehow or other, attended with an unusual amount of anxiety or even of risk, though a few seemed to regard it as one of average importance, occupying, for instance, a position somewhere between an excision of the head of a phalanx for the cure of a hammer-toe and an osteotomy of the femur for knock-knee.

ANATOMICAL NOTES.

The semilunar fibro-cartilages are connected by their anterior and posterior extremities with the head of the tibia, whilst their convex borders are attached to the margins of the tuberosities by the coronary ligaments. The latter connection, however, is not very substantial or important. The convex border of the internal cartilage has, in addition, a firm connection with that very important anatomical structure the internal

lateral ligament. But attachment of the outer disc to the external lateral ligament is prevented by the intervention of the tendon of origin of the popliteus muscle, which, lubricated by a process of the articular synovial membrane, passes out of the joint between the convex border of the disc and the external lateral ligament.

The result of these arrangements is that the internal fibro-cartilage is firmly fixed, whilst the other is comparatively loose, following the movements of the head of the tibia, or the external condyle of the femur, in flexion and extension of the joint.

If, with due regard to the anatomy of the joint, a student is asked which cartilage it is that gets adrift, he feels constrained to say, " The more moveable one ; the outer."

As a matter of fact, however, it is almost invariably the fixed, the inner one, which gets adrift and causes the trouble. The explanation of this is, I suppose, that the outer one, being able to follow every movement of the femur or tibia, be it ever so sudden or violent, generally manages to escape being hurt. It would be as impossible for the femur and tibia to catch, squeeze, disconcert, or detach the outer cartilage as it was for a couple of divisions to crush De Wet, whilst the stationary one, like Cronje, is pinched and torn.
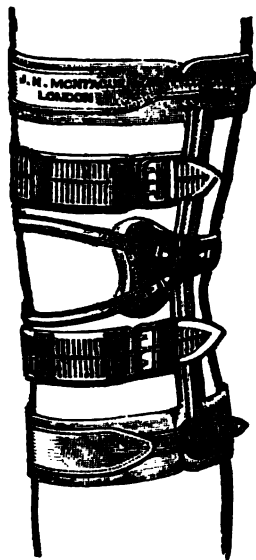
In his classical *Treatise on the Human Skeleton* (1858), Humphry wrote : " We frequently hear of dislocation of these " fibro-cartilages ; but I am not aware that the displacement " has been proved in any case by dissection, and can scarcely " understand how it should take place. Mr. Hey [1] first drew " attention to these cases. I have seen several instances of " the kind, but can form no more distinct idea of the exact " nature of the derangement that takes place than that " eminent surgeon appears to have done."

It would be interesting to know if Humphry found reason to modify this opinion. For in the later years of his life it was no unusual thing to open the joint for " internal derangement," and to find the inner disc loose, out of place, crushed, rent, or crumpled up, or thickened by injury and inflammation, and presenting a hard nodular mass in its substance at one part or another.

[1] " On Internal Derangement of the Knee-joint." *Practical Observations in Surgery*, 1803.

PALLIATIVE TREATMENT.

It by no means follows that because a man has a loose semilunar cartilage his knee-joint must be opened. It should first be seen if the wearing of an apparatus may not suffice to render the knee comfortable and trustworthy. The illustration which appears 'herewith represents the sort of splint which should be tried. It is made by Montague of New Bond Street. It confines the movements of the joint to flexion and extension, entirely checking that rotatory inclination with which the slipping of the cartilage is usually associated. This, I say, should first be tried, and in a certain number of cases it will answer perfectly well. But if after fair trial it is found ineffectual, the advisability of resorting to an operation can, of course, be considered.

If the splint proves successful it ought to be worn whenever the individual is walking, or at any rate whenever he would be likely to run the risk of imparting that sudden rotatory movement to the head of the tibia which is so commonly the cause of the slipping of the fibro-cartilage. At first he should be always wearing it, but, later, when he has learnt to keep a constant watch against irregular and harmful movements of the leg and foot, he need wear it only when he is about to take part in active exercises, such as golf or dancing, or riding on horseback.

As to football, hockey, and cricket, they must be given up absolutely and altogether.

I suppose that there is no game so likely to cause the derangement as football. At any rate, a large proportion of those persons who have come to me for the treatment of it attributed the first lesion to a hurt at football. In one case a sedate middle-aged man brought his knee into trouble by giving a loose kick at a ball with which his son was amusing himself upon the lawn. He struck the ball with the inner side of the toe of his boot whilst the leg was slightly flexed and

everted—just the very way to start the derangement or to invite its recurrence.

A few years ago I had under my care an International Rugby player who was the subject of a slipping of the internal fibro-cartilage. He was one of the finest specimens of an out-of-door man that I have ever seen. He was captain of his County team, and, next to the Bishop of the diocese, was, his doctor-friend led me to understand, the most prominent person in the county.

The surgeon to the County Football Club (for most important football clubs have, I believe, an honorary medical officer) sent me the following report when this champion paid me his first visit :—

"On November 5, 1898, he met with an injury playing at
" ——, walked off field, but played again at the 'half-time.'
" Saw a doctor who said that a tendon had 'gone wrong.' I
" saw him on his return ; he was very lame ; there was slight
" swelling and great tenderness over the insertion of the outer
" head of the right biceps femoris, but no direct evidence of any
" other mischief. Next day there was a considerable amount
" of fluid in the joint, with heat and tenderness. I put on a
" splint, and laid him up for a month. He played football for
" his County on December 18, and continued to play for the rest
" of the season without any further trouble. In June, 1899,
" whilst playing cricket, gave the same knee a sudden twist,
" fell down, and was unable to move. He was brought to me
" in a cab in great pain. He could not put his foot to the
" ground. There were slight swelling and tenderness in the
" inner side of the right knee joint over the position of the
" semilunar cartilage. He was invalided for a month, but he
" has never been really right since (although he has been
" working all the time), and he says that his knee has not
" troubled him at all.

" On September 30, 1899, after playing about twenty
" minutes down he went again, he could not move for a bit, but
" after 'half-time' would have another try but found it useless.
" The present condition you will see."

To the ordinary surgical reader, the chief feature in this graphic account of the recurring injuries is the unwisdom and determination which the man showed in resuming his place

in the game after his knee had just played him false. What pluck and what disregard of pain are called for by such behaviour !

I confess that to me it is no matter of surprise that the populace laid tributes at the feet of the gladiators of old, and hold in high esteem the international athletes of to-day. There is something manly and wholesome about it, and though it may be overdone at times, I personally would not have it altered.

Turning up the notes of this case, I thought that I might as well write to the county doctor for a report of the progress of the patient subsequent to the operation. This is his reply :—

DEAR MR. OWEN,   December 28, 1904.

*   *   *   *   *

" I find his knee is perfectly sound and has been so ever
" since the operation. He played for his County for two
" seasons after the operation, being captain of the team, his
" knee never giving him any trouble. He has retired from
" football this year in consequence of an injury to his *other*
" knee ; last Easter he had a little synovitis ; it soon got well
" but left a weakness."

I admit that I was a little disappointed at learning that this patient did not play in an International game after the operation. But one may safely assume, I think, that if he was able to captain his County team for two years after having had his fibro-cartilage removed, the result of the operation was entirely satisfactory.

There is this about the operation for the removal of the loose fibro-cartilage, that it is completely successful. I have met with no cases in which the result has been mere *improvement*, or anything but an unqualified success. (I am not alluding here to the risks attending the operation ; I am speaking only of the actual result of the removal of the loose body so far as the mechanics of the procedure are concerned.)

I have a friend, an old International Rugby player (a F.R.C.S.), who, when playing, slipped his internal cartilage, and for years was compelled in consequence to go about with his knee in a " cage." An offer of surgical treatment on my part, made the other day after we had been operating on a

young fellow for a similar condition, was declined with a smile, but he said that if, years ago, the operative procedure had been as safe and satisfactory as it is now, he would certainly have had his joint opened.

A "MARGIN OF ERROR."

One of the answers in the examination-paper already referred to, contained an extremely interesting and suggestive remark. It was to the effect that the synovial membrane of the knee-joint had no "margin of error." By which the writer meant, I take it, that if, by chance, any micro-organisms found their way into the opened joint, the synovial membrane had very little power of dealing with them. This is, unfortunately, absolutely correct.

It is fair, I think, anatomically to compare the large serous lining of the knee-joint with that of the abdomen—the peritoneum.—It is at once seen how feeble is the power of the former to protect itself. Sometimes after removing a gangrenous appendix we know full well that we have left a considerable area of peritoneal surface thickly infected with foul micro-organisms, which we have been quite unable to remove. We have wiped the area over with aseptic gauze—which may very probably have had the effect of introducing some of the germs into the sub-endothelial layer—or an attempt has been made to wash out the bacilli by gentle irrigation with a mild antiseptic lotion—which may possibly have caused an infiltration of the germs into out-lying crevices between neighbouring coils of intestine. At any rate, in whatever way the septic focus was dealt with, the surgeon knew full well that he had not removed *all* the germs ; that a *complete* removal of them was absolutely impossible, and that he was unable to rob the remainder of their power for harm. But whilst applying the dressings to the operation-wound he felt sure that he could trust the peritoneum to give a good account of the bacilli, for experience had shown him that it has a peculiar aptitude for overcoming such attacks. That it had, in fact, a large "margin of error." *A priori*, one might have expected that so large a synovial surface as that of the lining of the knee-joint should, in the normal state, have possessed a similar power in some considerable degree ; bu

as a matter of fact, in such a case it is absolutely helpless. It has, as the candidate wrote, no margin of error, and the risks of an operation upon the interior of the healthy joint are, therefore, ever present and very real.

A fair share of cases of internal derangement of the knee-joint have come under me for operation, and though, I am thankful to say, I have never had serious trouble with one, nevertheless two gave me for a while considerable anxiety.

The former of these was in a man on whom I had refused to operate because he was a relation. He talked me over, however, and in a weak moment I consented. He had a loose internal cartilage which continually slipped about when he was walking, and with such a noisy crackling that it was apt to attract the attention of any friend who happened to be with him. A few days after the operation the knee became distended and painful, and the man looked ill and anxious; his sleep was failing him and temperature was going up. How I wished then that I had rigidly adhered to my resolution never to operate upon a relative ! But it was too late ; the knee was swelling in its upper part and the patient was becoming apprehensive. So I had him placed under an anæsthetic, and made an incision into the sub-crureal pouch of synovial membrane, letting out several ounces of turbid synovial secretion. The tension being thus removed, his appearance at once improved ; sleep returned to him, and his temperature came down. The knee completely recovered, and a year or two later the man became captain of his Golf Club.

Another patient which for a while gave me great anxiety was an officer just returned from the South African campaign. The first or second time that his knee went wrong happened when he was kicking at a stray football—not in a match.

Before operating on him I had him in a Nursing Home, scrubbing and soaking him to free him of the accumulation of Transvaal grime. It seemed as if nothing short of boiling him for half an hour in a soda-solution would make him absolutely clean in a surgical sense. But after very thorough and deliberate preparation of the knee, I thought that the operation might be safely undertaken. All went on well for about a week, when he began to look ill and anxious, and his appetite failed ; his knee swelled and his temperature went up.

I told his friends of my anxiety, and I asked whom they would desire to see him in consultation with me. They fixed upon my late friend Mr. Walsham, who fully entered into the anxieties of the case and was genuinely sympathetic. "A fellow-feeling makes one wondrous kind." He told me that he had just recently had some most unhappy experiences in operating upon healthy knee-joints—cases " going wrong " in spite of his having taken the utmost care. In this case I opened the sub-crureal pouch, introduced a drainage-tube on the outer side of the joint, and washed out with a weak mercuric solution. I sent a specimen of the unwelcome accumulation to Mr. Leslie Eastes' laboratory, and in due course the report came back that the micro-organism present in the fluid was *staphylococcus albus.* My opinion is that the joint had become infected from the depths of the sebaceous follicles through the skin incision, and that the many months which he had spent in the Veldt, with but rare opportunities for changing his clothes and for washing, had rendered ineffectual the careful preparations which I had made with regard to the operation.

After draining and washing the joint, his knee completely recovered, and he re-entered the service of His Majesty.

Yet one other case which did not run a smooth course.—It was that of one of my late dressers at St. Mary's Hospital, whose knee I had to open for the removal of a moveable fibro-cartilage.

After the operation he had great pain in his joint, and the synovial membrane filled up with a material exactly like cold calves'-foot jelly.

In order to effect complete evacuation of the joint I had to make a counter opening in the sub-crureal pouch, from which we were able for two or three days to press out large masses of this peculiar material. The case did perfectly well, and the gentleman is now in the Royal Army Medical Corps.

Here, then, were three anxious cases which for a time were full of threatenings. I know nothing in the whole range of operative surgery which can cause a surgeon such distress as a knee-joint which is inflaming and becoming painful after an operation for internal derangement.

In the first place, the operation is generally called for in the case of a strong, vigorous, individual in the very prime of life.

As likely as not, he or she is an accomplished athlete—a football player, cricketer, boxer—I place the football player first. Then, the operation was not of absolute necessity. The worst, as a rule, that could be said for the knee was that it was not " trustworthy," that it was apt to throw the individual down in the rink, in the field, the street, or the ball-room. That when an apparatus was worn it generally behaved fairly well, though even then a slipping or locking sometimes occurred. That the condition was perhaps nothing worse than " vexatious," or inconvenient, but that as the individual knew of exactly similar cases in which a perfect result had followed operation, he or she would like it done, and was prepared to take all risks in connection with it.

An athletic young lady came to me a few months ago with a shifting cartilage in her right knee, which had been sent adrift some few years previously by a serious bicycle accident. She said that the knee was apt to " catch " as she was dancing or playing tennis, and she wished an operation done for it. She seemed to regard the operation with as little apprehension as one would attach to the proposal to excise a corn or to remove a wen. I explained to her that this was not the spirit in which to approach the operation, and that she had better go home and talk it seriously over with her friends before deciding to have it done.

* * * * *

Well, I eventually opened her joint, and found the anterior part of the inner disc lying right across the head of the tibia, so I cut it in two at the internal lateral ligament, removing about the anterior half. This joint is now quite sound, and the lady cycles again and plays tennis to her heart's content, and with confidence and safety.

If the operation for the removal of a loose semilunar cartilage is approached in a casual or irresponsible manner, there is a considerable risk of inviting disaster. I have heard of such a thing happening.

PREPARATION FOR OPERATION.

I like to have the patient lying up for at least three days before operating. During this time his urine is examined and

laxatives are given. He is ordered a light diet, and is put into strict training for a fortnight's close confinement to bed. His limb is shaved and cleansed, and scrubbed and cleansed again. And a leather splint is moulded on to the limb to be in readiness for application, subsequent to the removal of the wooden splint on which the limb is placed for the first few days after the operation.

The preparation of the limb must be carried out with vigour and thoroughness, but with *discretion*. A few years ago I operated oh an officer whose cartilage had been damaged in a night-march under Lord Methuen. He came to me through the Duke of Abercorn's Fund, and I placed him in a Nursing Home with full and definite instructions as regards the preparation. But the nurse had scrubbed the skin with an unnecessary zeal, and the subsequent application of the carbolic fomentations to the tender skin determined the occurrence of an acute dermatitis in the region of the proposed incision. I did not know of this until I uncovered the knee at the time appointed for the operation, and it then looked as if the patient had an attack of erysipelas. This, however, I knew was not the case, for the *streptococci* of erysipelas must have been of an unusual power of resistance to have survived the treatment which the nurse told me she had adopted ! It was evidently an aseptic dermatitis, so, without further hesitation, I cut through the red and œdematous integument and completed the operation in the usual way. The wound healed *per primam*, and the man rejoined his regiment in due course, and with a trustworthy limb.

I think that I have said enough to make my meaning clear that the opening of a healthy knee-joint is an operation that is not to be lightly undertaken, and I do not believe that any hospital-surgeon who has had his fair share of these cases will think that I have made too much of it. With due care the cases may be expected to go right ; they almost invariably do so.

THE OPERATION.

As regards the details of the operative procedure, I would say that, as I have already suggested, the patient is himself duly prepared for the ordeal, and that the skin in the neighbourhood of the incision is rendered as free of likely sources of

contamination as it is possible to make it. For I take it that it is as impossible to render the skin " absolutely aseptic " as it is to obtain theoretically a perfect vacuum under the air-pump. The swabs or gauze—which no one touches but myself and my assistant (who wears rubber gloves)—are duly sterilised, as are also the instruments and the silkworm-gut sutures. A three-inch vertical incision is made a little to the inner side of the patella, and, all bleeding having been arrested, the synovial membrane is opened, when, as likely as not, the fibro-cartilage is seen lying across the top of the internal tuberösity of the tibia, and perhaps detached to a considerable extent from the internal lateral ligament. This being the case, the knee is flexed, and the cartilage is cut across as far back as possible.

I leave in a drainage tube for 24 hours, securing its end by a skin stitch. After dressing the limb I place it on a long back-splint with a foot-piece, and raise it on a pillow. On the sixth day after the removal of the drain, and the seventh after the operation, I take out the surface-stitches, place a collodion dressing on the wound, and enclose the limb in the moulded leather splint which was prepared beforehand.

A few days later the patient is allowed to shift himself from the bed on to a sofa, and in about another week he is permitted to walk about the room, the limb being encased in the leather splint.

I strongly hold the opinion that no one ought to consider himself qualified to undertake this operation unless ample personal experience has shown him that he may trust himself, and his methods, to such an extent that he can almost promise that the operation shall not be attended with undue risk. He cannot, of course, say that there is " no risk."

There is not an operation in the whole field of surgery which can be performed with " no risk," nor is any surgeon justified in saying or implying to the contrary, even with the proper desire of inducing a patient to screw up his courage for an absolutely necessary treatment.

Not many months ago a middle-aged man came to consult me about a shifting fibro-cartilage which had got him into trouble on two or three occasions. The case was one in which I formed the opinion that he might find material assistance from having the knee caged in the hinged splint. I told him

that he ought to give this a fair and full trial, and that if, after all, it did not answer, he might consider the propriety of submitting to operation, but that before accepting it he ought to feel that he was *driven* to it.

He thanked me for my advice, and said that he would follow it, but that if the treatment failed he should get his practitioner to operate on the knee, as, in fact, he had already half arranged to do. He then said to me—with a note of interrogation at the end of his sentence—that he supposed it would be all right his arranging for his family doctor to do it ?

I venture to put the question to readers of this Journal, many of whom are in general practice, " What ought I to have said in reply ? "

I had not the pleasure of knowing his doctor, I had never heard his name before. Ought I to have said, " Oh, no ; this " is not an operation for a man in general practice. It is the " sort of operation that must be done by a hospital surgeon. " Kindly take my card for future reference " ? Or should I have said, " Certainly, let him do it. Operations turn out " extremely well in the country, and he no doubt will do it " very carefully and successfully " ? For aught I knew he was a most capable, trustworthy man, and for me to have hesitated to give a favourable reply in that direction might have been to do him a real injustice. No, I certainly could not say that probably he was not quite fitted to undertake the work, and apparently suggest a reversion of the case to me.—Well, I pretended not to hear his question, and, to my great relief, he did not renew it.

I have heard nothing further of the case. That is one of the drawbacks of consulting-practice ; the surgeon cannot " follow up " his cases. Did the splint prove successful, or did the doctor have to operate ? If the latter, how, I wonder, did the case turn out ?

Unfortunately, if a case turns out badly after operation no history of it is ever published. And what a pity that it is so ! The surgical statistician dangles his bright figures before the Profession and the public, and he lets them think that operations can now be performed almost without risk and well nigh without failure. But it does not need the possession of an unusual amount of surgical insight to know that things " are not always

what they seem." And I must admit that I have from time to time heard extremely unpleasant whispers about the results of operations for loose semilunar cartilages. What a pity it is, in the interest of surgical truth, that the clinical details of such cases cannot be—are not—fully published.

How instructive and valuable an article of a Confessional nature could be prepared for THE PRACTITIONER on cases which have "gone wrong" after operations for internal derangement of the knee-joint! The reports and comments might be sent to the Editor on the understanding that no names should be mentioned, and I am sure that the Editor in compiling the article—and subsequently—might be absolutely trusted to regard the names of the contributors in perfect secrecy—" Why did the cases go wrong ? " " How did they " progress ? " " What measures were taken to check the " disaster ? " and " What was the ultimate result ? "

An essay on these lines would prove of far greater practical value than any which could be written with a silver pen upon rose-tinted paper, and in ink pleasantly diluted with a convenient proportion of water from Lethe.

EFFECT OF RAW MEAT ON THE NITROGEN METABOLISM IN PULMONARY TUBERCULOSIS.*

"ZOMOTHERAPY."

By J. J. GALBRAITH, M.D.,

Research Scholar, Royal Victoria Hospital for Consumption, Edinburgh.

THE researches of Héricourt and Richet[1] on the effect of feeding tuberculous dogs on raw meat, have shown that the administration of raw meat was succeeded by a gain in weight, as compared with a loss in weight in control animals fed on cooked. They further showed that a similar gain followed the administration of juice, containing only a small percentage (0·57 per cent.) of the solids of the meat, and consequently only a correspondingly small quantity of nitrogen. Héricourt and Richet held that such a gain in weight on a comparatively meagre diet indicated that the raw meat exerted a specific influence on tuberculosis. Raw meat has, from time to time, been recommended as a constituent part of the dietary of the tuberculous human subject and striking results are obtained by its use.[2]

The clinical aspects of the raw meat treatment have been fully discussed in a communication to the January number of this journal by Dr. R. W. Philip, Honorary Physician to the Hospital, and will not be further alluded to except in so far as is necessary to explain the bearing of the experimental facts.

The following research was undertaken to elucidate the mechanism of the action and to determine whether the action was specific in the tuberculous subject only, or whether it was physiological and thus only indirectly antagonistic to the tuberculous process.

A direct increase in weight on a diet of beef-juice, relatively poor in nitrogen, and containing practically no fat, suggested that the action was possibly through some direct effect on the nitrogen metabolism.

The effect of raw meat on the nitrogen metabolism was

therefore investigated in two cases, in the following manner :—
The patients were put on a special diet (*see* below) for a
period of seven days to bring them, as far as possible, into
nitrogen equilibrium. Observations were thereafter made for a
period on cooked meat, and then for a further period on raw,
the other constituents of the dietary remaining as before. After
the raw meat period the subjects were again put on a cooked
diet and a further series of observations made. The diet was
as simple as possible, so as to facilitate analysis, and the food-
stuffs were, throughout the whole course of the experiments,
taken from the same samples, with the exception of the bread,
which was analysed in batches. The milk in the first experi-
ment was sterilised and similarly analysed ; in the second a
sufficient quantity for the whole period was sterilised and
stored in ice. The meat for the whole period was stored
frozen. This method reduced the analysis to a minimum and
insured that the intake should be as nearly as possible constant.
The whole quantity of food was always eaten, and the propor-
tion of meat in the dietary was that found clinically to give the
best results.

EXPERIMENT I.

Patient aged 27. Height 5 ft. 9½ in., weight 69·8 kilos.
Extensive bilateral disease with vomicæ. Patient had been
nine months in hospital and had not previously had raw meat.
Temperature sub-normal. Clinically the patient was stationary
and the early improvement had ceased. On the experimental
diet the patient lost fat, but soon commenced to gain weight
again, becoming much firmer.

Oatmeal	60 gms.	⎫
Rice	40 „	⎪
Butter	70 „	⎬ Off single mixed samples for
Fruit (Raisins)	30 „	the whole period of ex-
Sugar	60 „	periment.
Tea	8 „	⎪
Minced Meat	690 „	⎭
Bread	160 „	⎱ In batches varying only
Milk	1,200 c.c.	⎰ slightly in composition.

The meat was freed from fat, minced, thoroughly mixed,
weighed and stored frozen in waterproof parchment packets.

The nitrogen intake varied only slightly (*see* Chart I., p. 166), the variations being caused by differences in composition of the bread and milk. The average was 17·5178 grms. and the extreme variation 16·489 grms. and 18·132 grms. The oatmeal was given as porridge with breakfast, and the rice as pudding with the midday meal. The other items were divided up between the three meals by the patient himself. The nitrogen was estimated throughout by the Kjeldahl method. The urine was collected and analysed daily. The fæces were collected and weighed daily, sprinkled with H_2SO_4 and dried at 80° C. in three-day periods. Evacuations were regular throughout and no drugs were given. Limitation of fæces was not attempted in case the large amount of carbon necessary should cause irritation and nitrogen excretion. The leucocytes were counted at 8 a.m. before breakfast and at 4 p.m., two hours after dinner. Vegetables, &c. were purposely omitted as varying in composition and rendering analysis of the intake unnecessarily difficult and complicated. The diet was of considerably lower caloric value than the ordinary hospital diet, containing more proteid, but less fat and carbohydrate. The patient was kept on the above diet (cooked) for seven days, so as far as possible to attain equilibrium. During the succeeding six days the total nitrogen of the output and intake was analysed, the diet and cooking remaining the same. The meat was then given raw for a period of nine days, and for a further period of nine days it was again given cooked.

Period I. Six Days' Cooked Meat (see Chart I.).

The nitrogen excretion was fairly constant, averaging 15·0357 grms. daily. On an average 92·4 per cent. of the total intake was absorbed and 6·84 per cent. of the absorbed nitrogen was retained. The average nitrogen retention was 1·1019 grms. per day.

Period II. Nine Days' Raw Meat.

The nitrogen of the fæces rose from 1·3288 grms. to 1·5852 grms. per day, thus reducing the percentage absorption to 90·9 per cent. The excretion in the urine immediately fell to 12·775 grms. per day, rising again gradually with remissions, and only reaching its former level by the end of the

experiment. The nitrogen retention, in spite of the diminished absorption, rose to 2·2527 grms. per day, or 14·13 per cent., the maximum reached being 3·6997 grms. per day, or 22·46 per cent. of the absorbed nitrogen, as compared with a maximum of 1·3277 grms., or 8·32 per cent., during Period I.

To ascertain what the nature of the unabsorbed nitrogen was, 2 grms. of fæces were taken in an Ash Free Filter and washed with warm water at about 37° C. and the total nitrogen estimated. A like portion was heated for 20 minutes in the Autoclave and similarly washed and the nitrogen estimated. In spite of repeated washings with warm water the filter paper at the end was stiff with gelatine. The result indicated that 55 per cent. at least of the total unabsorbed nitrogen was in the form of collagen. The proteid nitrogen of high nutritional value was thus reduced to 2·23 grms., the balance of 2·7 grms. being proteid incapable by itself of sustaining nitrogen equilibrium. The fibre was visible to the naked eye in the powdered fæces.

Period III. Nine Days' Cooked Meat.

The diet during this period was prepared exactly as in Period I. The total nitrogen of the fæces gradually diminished

TABLE I.

Average Daily.	Intake.	Excretion.		Retention.
		Fæces.	Urine.	
Period I. - -	17·4663	1·3288	15·0357	1·1018 grammes.
Period II. - -	17·4334	1·5852	13·5955	2·2527 „
Period III. - -	17·6366	1·1428	14·9597	1·5341 „

TABLE II.

Average Daily Percentages.	Absorption.	Retention.
Period I. - - - - -	92·4 per cent.	6·84 per cent.
Period II. - - - - -	90·9 „ „	14·13 „ „
Period III. - - - - -	93·5 „ „	9·09 „ „

(an average of 1·1418 grms. per day), showing a progressive improvement in the alimentary chemistry. The average nitrogen absorption was 93·5 per cent. The excretion (with

the exception of one day) remained below the mean of Period I. The nitrogen retention continued high, averaging 9·09 per cent. The most marked effect was the establishment of the fact, indicated by the analysis of the fæces of the previous period, that the percentage absorption of digestible nitrogen of high nutritional value is increased by the action of raw meat. The gradual diminution in the unabsorbed nitrogen is probably due to some collagen being carried over from Period II., the nitrogen of the fæces at the end of Period III. being distinctly lower than during Period I. on a corresponding diet.

CHART I

CHART 2
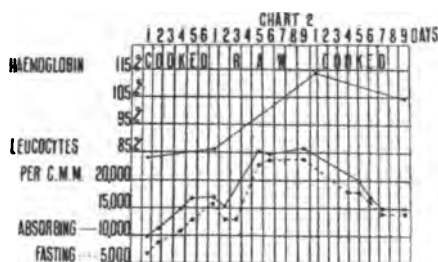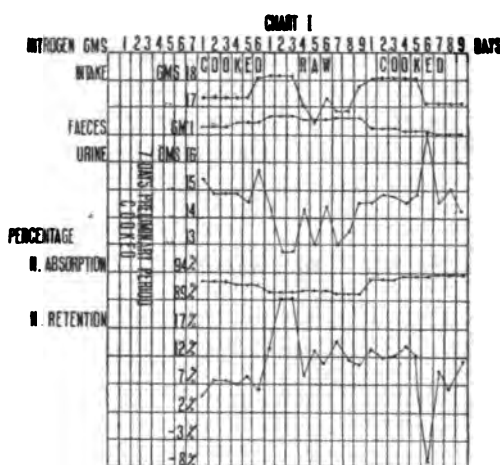
Periodic counts showed :—

 I. An increased digestive leucocytosis during the raw meat period, as compared with the second cooked period, the leucocytosis during the first cooked period being unusually high.

II. An increase in the total number of leucocytes, especially lymphocytes, during the raw meat period, subsiding during the second cooked period.

III. An increase in hæmoglobin percentage, 84 per cent. to 87 per cent. during the cooked meat period, and 87 per cent. to 115 per cent. during the raw meat period, falling during the second cooked meat period to 105 per cent.

The total leucocytes during the second cooked meat period returned to the same level as at the start of the experiment, and the large digestive leucocytosis diminished.

EXPERIMENT II.

Patient aged 18. Height 5 ft. 2½ in., weight 49·9 kilos. The second experiment was conducted on the same lines as the first with the exception that the meat was reduced by 90 grammes, and the milk was all got in one batch, sterilised and stored in ice, so that the nitrogen intake was absolutely constant throughout. Improvement was taking place on the ordinary hospital treatment. The nitrogen excretion was by no means as constant as in Experiment I. . The percentage absorption was higher, never falling so low as in Experiment I. After a preliminary seven days on the experimental cooked diet a first six-day period of analysis on cooked meat was undertaken.

Period I. Six Days' Cooked Meat.

The total nitrogen of intake was constant 14·6666 grms. The food was all eaten. Evacuations were regular and no drugs were given. The nitrogen of the fæces gave an average of 0·9213 grms. The average absorption for the six days was 93·75 per cent. of the intake. The average retention for the period was 0·6319 grms. per day, or an average of 4·6 per cent. of the absorbed nitrogen.

Period II. Six Days' Raw Meat.

The total nitrogen of intake. was the same as in Period I. (14·6666 grms. per day). The nitrogen of the fæces rose as in Experiment I. from 0·9213 grms. per day to 1·107 grms. per day. The absorption thus fell to 92·1 per cent. The excretion
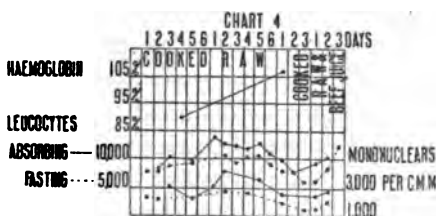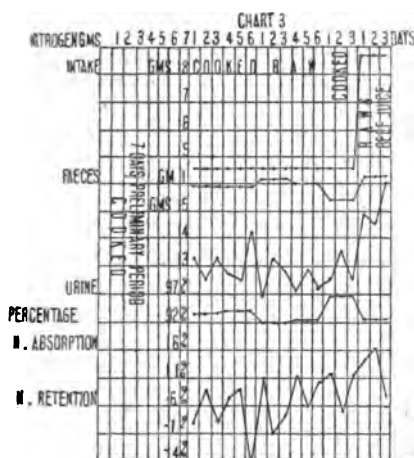
continued irregular, but fell to an average of 12·5655 grms. per day. The type of fall differs from that got in Experiment I. Instead of a sudden fall, gradually rising, as the period progressed, it exhibited a slowly increasing fall. The nitrogen retention for the six days was 5·9676 grms. as compared with 3·7916 grms. in Period I., or a rise from 4·6 per cent. to 7·32 per cent. Here, again, the characteristic feature of the change produced on the metabolism, is an increased retention occurring simultaneously with a diminished absorption.

Period III.—Three Days' Cooked Meat.

The patient was again put on cooked meat for a period of three days, the intake being still constant at 14·6666 grms. The nitrogen of the fæces fell, as in Case 1, to 0·484 grms. per day, giving an absorption of 96·7 per cent., or an improvement of 4·6 per cent. The nitrogen retention continued high for the period, being 3·9778 grms. or 9·36 per cent. of the absorbed nitrogen.

Period IV.—Three Days' Raw Meat and Beef Juice.

The reaction thus produced, though in the same direction as in the former experiment, was slighter in degree. It was resolved to try what effect pushing the diet would have on the absorption. The patient was accordingly again put on raw meat, to which was added the juice of 4 lbs. of lean beef per day. This increased the total nitrogen of the intake from 14·666 grms. to 18·7546 grms. per day. The total nitrogen was thus increased by about 28 per cent. In spite of this large increase, there were no symptoms of disturbance. The unabsorbed nitrogen was only slightly higher than during the previous raw meat period, and the percentage absorption was 92·7, being actually higher in spite of the large increase in the intake. Retention rose to 12·83 per cent. An attempt was then made to substitute cooked proteid in the form of boiled eggs for the beef-juice for a further three-day period; but the patient was immediately sickened. This may have been due to the fact that on that day he showed signs of an incipient coryza. It was decided, in case of fallacy, to suspend observations.

CHART 3

NITROGEN GMS. 1 2 3 4 5 6 7 | 2 3 4 5 6 | 2 3 4 5 6 | 2 3 | 2 3 DAYS

INTAKE ... GMS | 8 COOKED | RAW

7-DAYS PRELIMINARY PERIOD / COOKED

FAECES

URINE ... 97%

PERCENTAGE ... 32%

N. ABSORPTION ... 63%

N. RETENTION ... 5%

CHART 4

1 2 3 4 5 6 | 2 3 4 5 6 | 2 3 | 2 3 DAYS

HAEMOGLOBIN ... 105% COOKED RAW

95%

LEUCOCYTES ... 85%

ABSORBING — 10,000

FASTING ---- 5,000

MONONUCLEARS

3,000 PER C.M.M

1,000

Blood Counts.—During Period I. (cooked meat) the leuco-cytes averaged 8,600 per c.mm. fasting. The lymphocytes were at 16 per cent. During Period II. (raw meat) the leucocytes rose to 10,200 per c.mm. fasting. The digestive leucocytosis was much more marked than with the cooked. The total lymphocytes increased from 16 per cent. to 21·5 per cent. fasting. During Period III. (cooked meat) both the total leucocytes and lymphocytes fell, and the digestive leuco-cytosis was diminished. During Period IV. (raw meat and beef-juice) the leucocytes rapidly rose from 6,200 per cmm. to

TABLE · III.

Average Daily.	Intake.	Excretion.		Retention.
		Fæces.	Urine.	
Period I. - -	14·6666	0·9213	13·1133	0·6319 grammes.
Period II. - -	14·6666	1·1070	12·5655	0·9946 ,,
Period III. - -	14·6666	0·4840	12·8567	1·3259 ,,
Period IV. - -	18·7546	1·3737	15·1513	2·2296 ,,

TABLE IV.

Average Daily Percentages.	Absorption.	Retention.
Period I. - - - - -	93·75 per cent.	4·6 per cent.
Period II. - - - - -	92·1 „ „	7·32 „ „
Period III. - - - - -	96·7 „ „	9·36 „ „
Period IV. - - - - -	92·7 „ „	12·83 „ „

12,500 per cmm., the digestive leucocytosis again becoming marked. The hæmoglobin showed a steady rise during the course of the experiment, 90 per cent. to 109 per cent. (*see* Chart IV.).

Two experiments on similar lines were undertaken to ascertain whether a similar effect was produced in the physiological subject. In both of these an identical effect was produced, although in both the diet was too limited to cause a positive nitrogen balance. Owing to the low caloric value of the diet, only a decrease in nitrogen loss was produced, though the blood-changes were almost identical. The digestive leucocytosis was markedly increased (Chart V.), though no discoverable increase was detected in the numbers of the leucocytes fasting. The tables showing a summary of the results are given below. The second experiment was done in co-operation with Dr. John Malcolm, Lecturer on Physiological Chemistry, University of Edinburgh, and I take this opportunity of acknowledging my indebtedness to him for advice and help during the whole course of the work, and to the assistance I derived from his large experience in metabolism work.
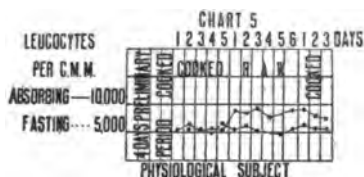
PHYSIOLOGICAL EXPERIMENTS.
TABLE V.—EXPERIMENT I.

Average Daily.	Intake.	Excretion.		Retention.
		Fæces.	Urine.	
Period I. - -	13·0670	1·0275	13·426	− 1·3865 grammes.
Period II. (Raw) -	13·1195	1·1120	13·148	− 1·1405 „

TABLE VI.

Average Daily Percentages.	Absorption.	Retention.
Period I. - - - - -	92·1 per cent.	—11·52 per cent.
Period II. (Raw) - - -	91·5 ,, ,,	— 9·5 ,, ,,

TABLE VII.—EXPERIMENT II.

Average Daily.	Intake.	Excretion.		Retention.
		Fæces.	Urine.	
Period I. - -	8·1431	0·4765	8·4692	—0·8026 grammes.
Period II. - -	8·1359	0·6019	8·2658	—0·7652 ,,
Period III. - -	8·1304	0·6030	8·0675	—0·5400 .,

TABLE VIII.

Average Daily Percentages.	Absorption.	Retention.
Period I. - - - - -	94 per cent.	10·47 per cent.
Period II. - - - - -	93·23 ,, ,,	10·2 ,, ,,
Period III. - - - - -	92·7 ,, ,,	7·17 ,, ,,

The conclusions to be drawn from the observations given above are that cooking materially affects both the absorption and retention of nitrogen, both in the physiological and in the tuberculous subject. While the total quantity of nitrogen present in the fæces on a diet of raw meat is increased, that increase is due entirely to the presence of collagen; the soluble and digestible nitrogen is actually diminished. Gelatine has been shown to be by itself incapable of sustaining nitrogen equilibrium. The chief points of interest are that raw meat causes an increased retention of nitrogen, even with a diminished intake, and it also causes an improvement in intestinal metabolism, manifesting itself in the form of a diminution of the nitrogen of the fæces, on returning to a cooked diet the nitrogen of which is theoretically all capable of absorption. The digestive leucocytosis I have invariably found to be larger on a diet of raw meat than on a diet of cooked. This may be correlated with the increased nitrogen retention, on the supposition that the digestive leucocytosis is the evidence of a functional activity on the part of the

leucocyte, the object of the activity being the secretion of a body to link the absorbed nitrogen on to the tissue-cell.

The production of the leucocytosis has also a definite relationship to the beneficial effect of a meat diet.[2] That it produces an artificial stimulation greater than that produced by the cooked, is shown by the fact that the changes in the blood (hæmoglobin and leucocytes) subside on reverting to the cooked diet. In Experiment II., Period IV., the total nitrogen was increased by about 28 per cent. by the addition of beef-juice, but the percentage absorption is slightly greater (92·1 per cent. to 92·7 per cent.) than during the previous period, the diet containing the same amount of indigestible nitrogen. This is important in view of the present reaction against increasing the diet of tuberculous patients, and would seem to indicate that forced feeding is beneficial, provided the patient be not indiscriminately stuffed, but the proper constituents of the diet be increased. It is also interesting to note that both patients did better clinically on the experimental diet than on ordinary hospital diet, though the caloric value was 20 per cent. to 25 per cent. less.

Both were cases of advanced bilateral disease with excavation.

The most recent work on the metabolism in tuberculosis has been done by Goodbody, Bardswell, and Chapman.[3] These observers have estimated the excretions with extreme care. They have apparently concluded that proteid is of equal value dietetically, whatever its nature and source, and have taken no account of the effects of cooking.

In the above experiments the maximum amount of cooked nitrogenous food that could be digested was given. This was determined by previous clinical observation. In Experiment II., Period IV., the nitrogen intake was increased by about 28 per cent., with an increased percentage absorption, and thus far our results differ.

The muscular wasting in tuberculosis is such a marked feature of the disease as to have given the name Phthisis to its most familiar manifestation ; associated with this change in the skeletal muscular system we have a corresponding change in the non-striped and heart muscle. This is detected clinically by the soft pulse, generally rapid, and constipation or intestinal

atony. Associated with the visible muscular atrophy, we have an increased irritability of the muscles themselves, causing the local contraction on tapping, and in more marked cases the " running wave." The above signs and symptoms are constantly present in all cases in relative varying degrees of severity. This points to one of the essential features of the disease being a muscular dystrophy, brought about by toxic poisoning.

Chalmers Watson[4] has recently drawn attention to the beneficial effects of raw meat in avian tubercle, and I have found that invariably the skeletal muscle of the tuberculous fowl is almost practically absent in the wings and breast at death, and much atrophied in the hind limbs, while the abdominal organs are embedded in a mass of fat.*

In the human subject likewise fatty degeneration and infiltration are constant features of the later stages of the disease. This shows that a diminution in fat is not essential to tuberculosis, except in so far as it is used up as a fuel to make up the caloric value of a scanty and poorly-assimilated diet. It is surely not necessary that the tuberculous subject should be compelled to convert an excess of fat, cod-liver oil, and carbohydrate into muscle. That fat and carbohydrate are necessary items of the human dietary is one of the fundamental facts of human physiology, and a deficiency in these elements and a corresponding lowering of the caloric value of the diet prevents both the physiological and tuberculous subject from taking advantage of the increased power of nitrogen fixation, as seen in the physiological experiments.

A series of experiments are in progress at the Research Laboratory of the Royal Victoria Hospital dealing with the effect of raw animal proteid other than that of muscle. It is a significant fact concerning the relation of muscle substance of the toxins of tubercle that tuberculosis of muscle is extremely rare, pointing to some antagonism. The action on nitrogen metabolism in not specific to tubercle, and throws light on the process of vitalization of proteid.

The relation of the toxins of the disease to the nitrogen metabolism is necessarily a complex subject, but the relationship is certainly intimate. The facts given above have led me

* Similar conditions obtain in bovine tuberculosis.

to offer the following tenative explanation, the details of which are obscure, but it seems so far to explain the main features.

The digestive leucocytosis, more properly the absorptive leucocytosis, is associated with the absorption of proteid from the alimentary canal, and is concerned in nitrogen metabolism. I have found that the increase is mostly in the lymphocytes and mononuclear cells, though the polymorphic forms are also increased. This may have an important relationship to the life-history of the leucocyte as recently put forward by Gulland,[5] who holds that certain forms of the polymorphonuclear cell are a late stage in the life-history of the lymphocyte ; while the mononuclear cells are intermediate (*Brit. Med. Journ.*).

The lymphocyte also has a direct relationship to tuberculosis, the cells of the tubercle nodule being almost entirely lymphocytic, or at least mononuclear. The function of the lymphocyte in the nodule must be protective and concerned in antitoxin formation. The fact that tuberculin causes evanescent increase in the consolidation and physical signs of pulmonary tuberculosis supports this contention.

The toxins of tubercle are undoubtedly complex, and antitoxin formation does not follow the simple lines on which the corresponding bodies are formed, *e.g.,* in diphtheria. They probably are somewhat similar to those of most of the diseases in which an intermediate body or amboceptor takes part in the toxin formation. The amboceptor has been supposed by Ehrlich to be physiologically present in the blood and to have a nutritive function. It is at least possible that the amboceptor of one group of the tubercle toxins is identical with the body which functions as the link in nitrogen fixation, and which, as shown above, there is reason to think is a secretion of the lymphocyte, which cell certainly has some relation to the tuberculous process. If the affinity of the absorbed proteid for the linking body were not less than the affinity of the toxin for the same substance, nitrogen metabolism would not suffer in tuberculosis.* Pathological affinity must therefore be greater than the corresponding physiological, so that the using up of the amboceptor in the formation of the complete toxin would

* Researches on the direct action of the toxins of tubercle (done by Dr. Malcolm and myself in the Physiological Laboratory) bearing on this point will be published shortly. The results support the above contention.

induce a nitrogen starvation of the muscular tissue. This nitrogenous starvation, whatever the immediate cause, certainly does occur. It has further been stated[6] (Welsh, Huxley Lecture, 1902) that the amboceptor is common both to the complete toxic molecule and to the corresponding antitoxic, the resulting body is toxic or curative according to whether the amboceptor unites with a toxophore or a haptophore group. This would mean that the antitoxic molecule also contains the secretion of the lymphocyte, so that the increase of the numbers of the specific cell in the blood, and therefore functional action, as urged by the writer in a former communication,[2] must have a beneficial effect on the disease. Such a hypothesis explains both the relationship of the muscle substance to the toxic poison, and the marvellous improvement produced clinically by a raw meat diet. It would also account for the fact that only in certain cases is raw meat curative. It is found clinically that in some cases, and especially in advanced and long protracted disease, while temporary improvement nearly always takes place, the diet fails to be curative. In other words, the specific resistance is worn out, or, pathologically, the formation of the other specific constituent or haptophore group is deficient, while the formation of the complete antitoxin necessary for cure is rendered theoretically possible, it does not actually take place, because raw meat does not possess a specific stimulus for the secretion of the latter group. Héricourt and Richet formerly held that the stimulus is specific and the results of the absorption of a ferment destroyed in cooking. It has been shown that the formation of antibodies takes place from the injection of certain substances, and that a similar effect follows ingestion of the same substance by the mouth. The resulting production is trivial in amount and seems to show that while the absorption of a ferment-like body unchanged in small quantity is possible, it is hardly likely to account for such a marked reaction as that got by Héricourt and Richet. That certain types of tuberculous disease or certain individuals do not react is shown by the fact that Laurason Brown,[7] and Fraenkel and Sobernheim[8] have failed to confirm Héricourt and Richet's results; while other observers, notably Corneil,[9] have produced identical effects in tuberculous dogs. The result is

probably common to other forms of raw animal proteid, but is especially marked with raw meat, which has the additional advantage of containing hæmoglobin in the fresh state, which corrects the anæmia or oligochromæmia of the disease.

I have to thank Prof. Schäfer for affording me the opportunity of doing part of the research in the physiological laboratory of the university, and for the interest he has taken in the work.

I am specially indebted to Dr. R. W. Philip, whose active interest in the scientific aspect of tuberculosis has resulted in the foundation of the Research Laboratory and scholarship at the Royal Victoria Hospital for Consumption. Dr. Gilchrist, resident physician at the Brompton, and formerly at the Victoria Hospital, has given me much able assistance, especially in the clinical part of the work and in the blood examinations.

REFERENCES.

[1] "Raw Meat in Tuberculosis." Héricourt and Richet: *Compt. Rend. de l'Acad. de Sciences*, 1900, p. 65.

[2] "Dietetic Treatment of Pulmonary Tuberculosis." Galbraith; *Brit. Med. Journ.*, March, 1903.

[3] "Metabolism in Phthisis." Goodbody, Bardswell, and Chapman: *Medico-chir. Trans.*, Vol. LXXXIV.

[4] "Effects of Proteid Dietary." Chalmers Watson: *Med. Chir. Trans.* Vol. LXXXVII.

[5] Gulland: *Brit. Med. Journ.*, "Discussion on the *Rôle* of the Leucocyte," 1904.

[6] "Antitoxin Formation." Welsh: *Huxley Lecture*, 1902.

[7] Lawrason Brown: *Amer. Jour. of Med. Science*, June, 1903, Vol. CXXV., p. 1071.

[8] "Zur Frage der Zomotherapie." Fraenkel and Sobernheim: *Berlin. klin. Woch.*, July 15, 1901.

[9] Corneil and Chantemesse, &c.: *Trans. Brit. Cong. for Tuberculosis*, 1901.

SOME POINTS IN THE SURGICAL TREATMENT OF INTESTINAL OBSTRUCTION.

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(Concluded.)

[With Plates XIII.—XV.]

PERMANENT ENTEROSTOMY (COLOTOMY).

PERMANENT enterostomy for intestinal obstruction is most frequently employed in the treatment of irremovable malignant growths of the large intestine, particularly of the rectum and sigmoid flexure.[1] It is occasionally employed for irremovable pelvic tumours, for ulcerations, and for retro-vesical fistulæ. When performed on the small intestine, it is incompatible with much prolongation of life ; and here, as well as in some conditions of obstruction of the large bowel above the sigmoid flexure, some form of intestinal anastomosis may be more advantageously employed. And Bidwell, in an excellent paper (*Brit. Med. Journ.*, 1902, I. 325), urges that permanent colotomy should never be performed for any rremovable growth situated above the middle of the sigmoid flexure ; but that an ileo-sigmoidostomy should then be performed, with or without a temporary anus, which is subsequently closed.

Inguinal colotomy, cœlio-colotomy is that now generally employed, and lumbar colotomy is almost obsolete. It is an operation which, in itself, should not have a high mortality in the present day ; but one is met by the circumstances that not only is the operation usually done for intestinal obstruction,

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[1] The following account of an accidental enterostomy is taken from Dionis, 1733 :—" What happened to a Soldier in the *Invalides* is too singular to amount to an Instance in Practice, since 'twas Nature alone which wrought his Cure, in which the Industry of the Chirurgeon had no part; she her self provided a Sink through the Wound in his Belly, to which the wounded Intestine sticking fast, he daily, through that Aperture, voided his Excrements; which passing involuntarily, he was forced to keep a Tin Box at that Place to receive them ; he no longer voided them by the *Anus ;* and what thus came from him through the Wound had no Stench, by reason the pure *Chyle* was not yet wholly separated, and that the grosser *Sulphurs* had not time to discover themselves by the Fermentation which attends evacuated Excrements." Apart from the interest of the narrative, the reader will note this reference to "fermentation" taking place in the lower bowel

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but for patients with cancer. Colotomy performed upon
a cancerous patient, weakened by prolonged disease of a
hæmolytic and often septic character, is in itself an operation
of severity ; and the mortality may be regarded as trebled, to
say the least, when intestinal obstruction coexists. The varia-
tion in the statistical successes of different surgeons is explicable
less by their dexterity than by the question of the stage of the
disease in which they elect to operate.

Colotomy is a voluminous subject in its past and present
history and methods, freely recorded in surgical works. I will
therefore confine myself to the method which seems to me the
most satisfactory, based upon that of Maydl, with slight
modifications—including those of Reclus—who omitted the
sutures originally employed. (Reclus : *Bull. de Société de Chir.*,
Feb. 1890). We may take inguinal colotomy as an example
of this method, which is simple, expeditious, and gives satis-
factory after results.

Remembering that the iliac loop of the sigmoid flexure is
usually situated close to the anterior superior iliac spine, the
outer half of Poupart's ligament, and the anterior half of the
crest of the iliac bone : an incision, some two inches long—as
short as convenient—is made a little above the level of the
anterior superior spine, and in a direction upwards and inwards,
corresponding to the direction of the muscular fibres of the
internal oblique muscle. The aponeurosis of the external
oblique is divided across its fibres in this direction ; otherwise
it subsequently contracts the outlet. The muscular fibres of
the internal oblique and transversalis are merely separated by
the fingers, and are held apart by the 1st and 2nd fingers of the
left hand inserted as retractors. Then the subperitoneal tissues,
and afterwards the peritoneum, are lifted up in two pairs of
catch forceps and divided between them, the peritoneal opening
being stretched to the necessary extent by the forefingers of
the two hands. The colon may then present in the wound,
recognisable by its peculiar feel, and its muscular bands and
appendices epiplöicæ ; but not infrequently the small bowel
presents first and must be turned aside. If the large intestine
should not be at once visible, the finger should be passed
inwards along the wall of the false pelvis posteriorly until the
required gut is met with ; this is the most certain method of

finding it. The loop of gut is then caught by holding its mesentery between the 1st and 2nd fingers of the left hand, inspected, and the upper end pulled upon until there is no slack bowel above which might subsequently prolapse. With the mesentery so held by the two fingers, a pair of forceps is thrust through the mesentery, opened, and as it is withdrawn a thick glass or other rod is placed within its blades and is brought back with the instrument. The rod then securely supports the loop of bowel. A pair of forceps covered with lint, or a boiled penholder, will act equally well in emergency. No deep sutures should be used, sero-muscular union being very secure, and the peritoneum is not brought up to the skin. At most, a superficial stitch may be placed at each end of the wound (Fig. 6).
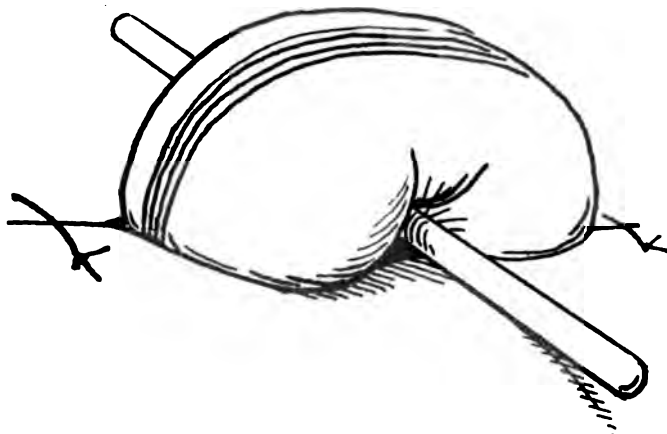

Fig. 6. *Maydl-Reclus method of performing Colotomy.*

It will sometimes be found that the mesentery is unduly short, so that there is excessive strain. It is then wise to ligate and divide the central portion of the mesentery ; otherwise there may be pressure-necrosis of the posterior wall of the gut against the rod ; or else, when the rod is removed later, the spur will tend to drop back. The mesentery may also be divided, if desired, so that the skin can be sewn under the middle of the loop of bowel to form a bridge and increase the effectiveness of the spur, but this is usually unnecessary, and overmuch suturing is undesirable. The dressings consist of a piece of gutta-percha tissue, or oiled silk, placed over the gut,

M 2

with holes through which the ends of the rod project; a few strips of gauze, or boric lint, wound round the whole, the first layer being passed under the rod to support it from the skin; and finally a very thin film of wool. A long and broad piece of strapping is passed round the back of the patient, and split at the ends which are made to decussate closely round the dressings and base of the gut. In this way the rod prevents the bowel dropping back; and the decussating strapping, so applied, prevents any prolapse of the bowel afterwards. Indeed, it is very rare with this method to see any tendency to prolapse, a sequel formerly very common, and still so, with some of the methods recommended. But I have seen the bowel soon distend from the tension of the contained gas so as to be almost on the point of bursting, and to require tapping followed by immediate drainage. One marked advantage is that, even before opening the gut, the obstruction is often in part relieved, partly from the support to the cancerous bowel below, and partly from the fact, that if the strapping be not applied right over the top of the button of gut, gas may pass over the rod and down the distal end per anum; so that opening the bowel in such a case may be advantageously delayed. If the obstruction be severe and the condition of the patient serious, then the upper end of the bowel should be drained at once by either of the methods employed for temporary enterostomy (Fig. 5). More lives will be saved than lost by this measure, so that the surgeon need not hesitate to open at once, and drain as in Fig. 7, for instance.
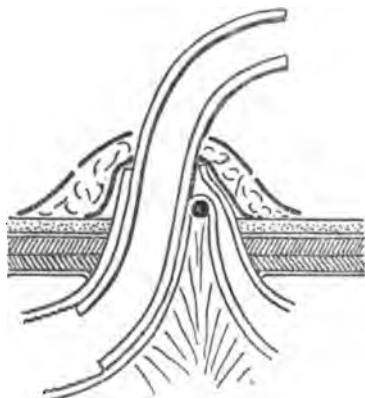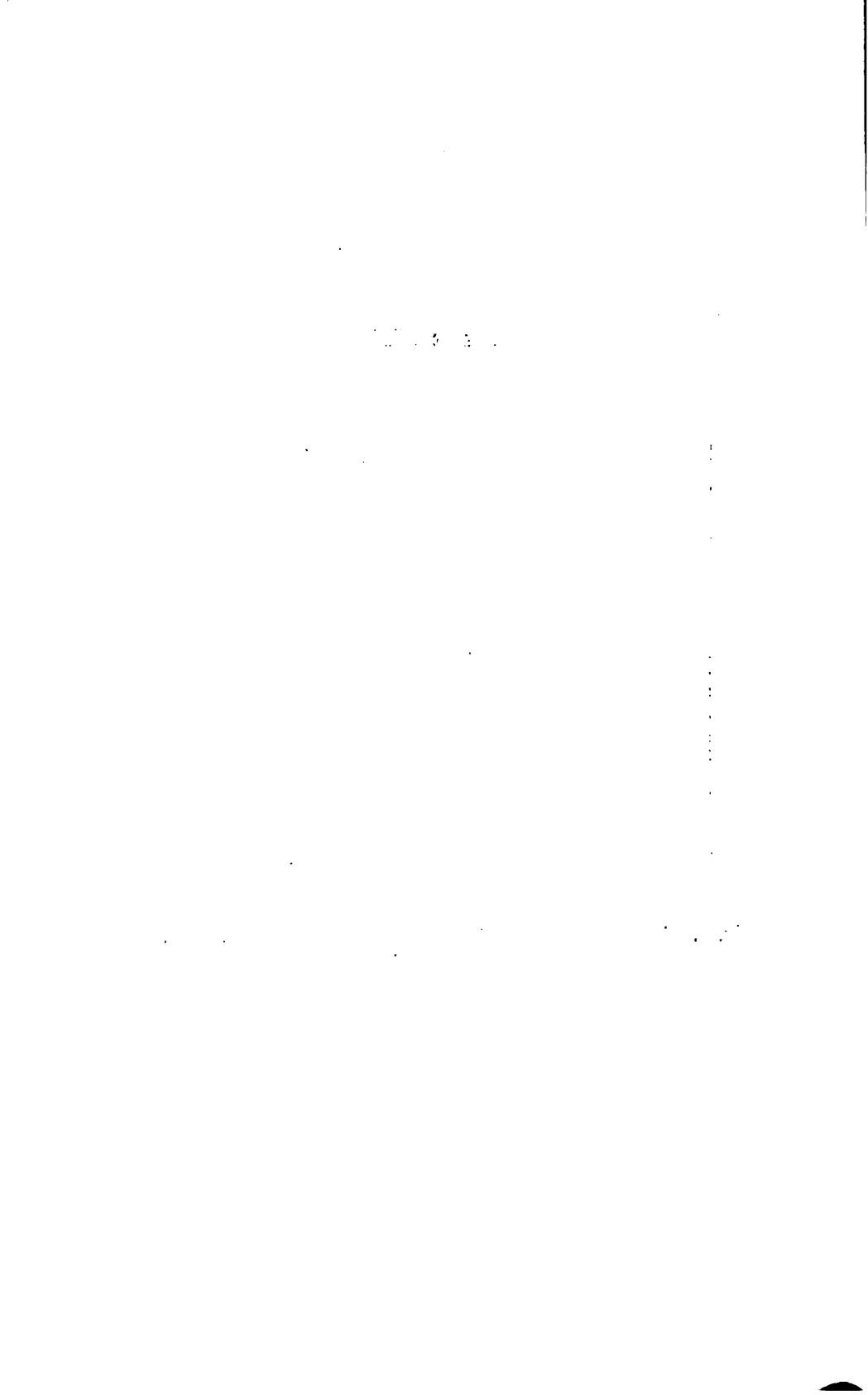

Fig. 7. *Colotomy with drainage.*

PLATE XIII.

Fig. 8. *Colotomy, showing pouting anus, a good spur, and upper and lower orifices.*

At the end of 24 hours, if the bowel was not opened at first, the union is secure enough to incise the bowel directly (without an anæsthetic) in the transverse axis. But this may be deferred for a few days, if the condition of the patient be very satisfactory, no dressings then being necessary ; although it is better to drain too early rather than make the mistake of draining too late. The supporting rod is left in for about a week or longer, at the end of which time there is usually a good durable spur, and the loop of bowel may then be completely divided if desired to lessen the chance of any fæces passing per rectum. A pouting anus usually results, with a central projecting spur, and upper and lower orifices (Fig. 8), and in a few weeks the patient usually gains a considerable amount of control over the evacuations, and need only wear a shallow cup of rubber, with a ring pessary enclosed in its circumference, and fixed to the body by an attached broad belt. By the employment of an early morning saline draught the patient may obtain a morning evacuation, and in most cases enter into social or business duties during the day with tolerable comfort.

<center>ENTERECTOMY.</center>

It is impossible, within the limits of a short paper, to discuss the details of the sixty methods of enterectomy which have been described. I will rather confine my remarks to a few points of special interest and importance.

Enterectomy is by no means a recent operation, and the excision of gangrenous sloughs in strangulated hernia was probably practised at an early date. Towards the end of the 13th century a bobbin, made out of a calf's trachea, was employed in Paris for enterorrhaphy in the same way as the decalcified bone bobbin of the present day ; and in the 16th century it is recorded :—"There are some fools who, before suturing the intestine, insert a canula composed of elder pith, or a piece of dried artery of some animal, or a bit of another intestine." (*Brit. Med. Jour.*, 1901, II., p. 143.) Some time prior to 1720 Thomas Brayn, a veterinary surgeon of Yeaton, Salop, removed about 27 inches of bowel from an ox suffering from intestinal obstruction, and performed enterorrhaphy over a hollow keck 3 or 4 inches long. " The ox dunged, the piece

of keck came away with the dung, and the ox lived to do the owner service several years." (*Cheselden's Anatomy,* 1730, p. 151.) In 1727 Ramdohr successfully removed 2 feet of gangrenous intestine (*N. Y. Med. Rec.,* September 22, 1883); and in *Heister's System of Surgery,* 7th edition, 1763, it is mentioned that Ramdohrius, surgeon to the Duke of Brunswick, cut off a large part of a ruptured gangrenous hernia, inserted one end of the remaining bowel into the other and tied them together loosely with a string. The woman recovered and discharged her fæces afterwards by the anus as before. (Wm. Wright, *Brit. Med. Jour.,* 1903, II., 767.)

With regard to the *amount* of bowel which may be removed, the surgeon need have little temerity, and may usually select an area wide of the disease for enterectomy. Several writers have of late collected statistics bearing upon the removal of great lengths of intestine, and it has been found that, roughly speaking, both from experiments on animals and post-operative observations on man, about a third of the intestines may be removed with subsequent enjoyment of health; but that if more than this be removed, the subject suffers from sickness, diarrhœa, and wasting, ending eventually in death. And this estimate as to the amount of physiological redundance of gut normally possessed by an individual has been confirmed by accurate chemical analysis of the fæces in a few cases following operation. It is also the amount estimated by Nicholas Senn (*Experimental Researches on Intestinal Surgery,* 1890). Out of 36 recorded cases of removal of great lengths of intestine collected by Augustus C. Bernays, 22 recovered permanently; and of 11 cases in which over 200 centimetres (7½ feet) were resected, 5 seem to have permanently recovered. (*Ann. Surg.,* 1902, I., 795.)

We may consider the subject of removal of bowel under three heads:—(1) Primary enterectomy; (2) Enterostomy with subsequent enterectomy; (3) Enterectomy with immediate enterostomy: illustrating each with a few observations.

PRIMARY ENTERECTOMY.

Primary enterectomy should not be performed, as a rule, when there is obstruction following a chronic disease like

cancer; for it is found by abundant experience that such patients are then more likely to die than if a preliminary enterostomy be first performed to relieve the intestinal toxæmia.

In the more acute obstructions, occurring suddenly in an otherwise healthy patient, such as in gangrenous femoral hernia, the results are much better; and when one considers the great advantages otherwise in avoiding even a temporary fæcal fistula, in such cases, primary enterectomy is often the best treatment when employed judiciously. Primary enterectomy is almost limited nowadays to excision of intestinal tumours in the absence of intestinal obstruction, and to cases of distinctly gangrenous bowel.

With regard to the primary excision of intestinal tumours little need be said, for the subject is fully dealt with in text-books. But with regard to the treatment of gangrenous hernia surgical practice has recently undergone a considerable change; and as any medical man may meet with a gangrenous hernia, particularly femoral in women, it may be well to refer to a few points.

At the outset it may be desirable to protest and warn against unnecessary excision of gut. As a matter of experience it is usually found that when the decision is doubtful as regards the vitality of the bowel, Nature will succeed better than the surgeon who performs premature enterectomy; and when only small patches of gangrene are present it may be possible to invert them into the gut by sutures. But we may confine ourselves to those cases in which the operator, on careful contemplation, feels assured that the bowel cannot recover if returned into the abdomen : the peritoneum may have lost its gloss, or the bowel its tone, so that it feels like a piece of wet paper; or considerable or multiple slaty areas of commencing sloughs exist in a dark background; or when, on releasing the gut and moistening it with warm saline solution, there is no sign of a change in colour, indicating returning circulation. It is in such cases as these, better seen than described, that primary enterectomy should be performed, if the patient can stand the prolongation of operation. The old plan of treatment was to leave the stricture undivided in such cases, and to make an exit for the fæces by incising the bowel.

But, apart from the inconvenience of the fistula and subsequent
operation for its cure, the method is found to have a higher
mortality than enterectomy.   From a very elaborate paper by
C. L. Gibson in the *Annals of Surgery*, 1900, II., p. 676, we
find the mortality in 354 operations for gangrenous hernia to
be as follows :—Primary enterectomy, 26 per cent. ; resection
with artificial anus of ends of intestine, 50 per cent. ; artificial
anus alone, 53 per cent.   He also quotes Zeidler's statistics
recorded ten years earlier, giving a mortality of 50 per cent.
for resection, and 74 per cent. for artificial anus.   So that,
making all due allowance for the vagaries of statistics, the
advantage lies with immediate enterectomy.   Therefore, should
the practitioner meet with a case of distinctly gangrenous
hernia, he may feel assured that his patient will have the best
chance if the gangrenous gut can be removed and the intestine
sutured and returned.

As to the method to be employed for resection there is little
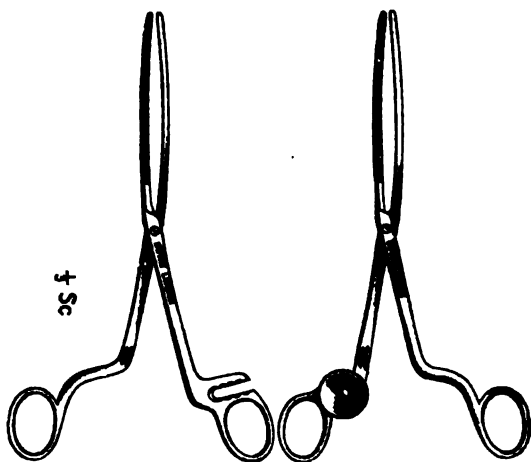to choose between simple suture and the use of a button or

Fig. 9. *Author's twin-clamp forceps for Enterectomy.*

bobbin—the mortality is found to be about equal with each.
Whilst in the British Isles the tendency of most surgeons is to
employ simple suture, and to obtain better results thereby, in
America the Murphy button is still largely employed, and by
many preferred to suture.   Personally, I prefer simple suture as

a rule ; and in order to render this a more simple measure,
particularly when skilled assistance is wanting, I have intro-
duced some special intestinal anastomosis forceps (Fig. 9),
and have myself employed them recently for two cases of
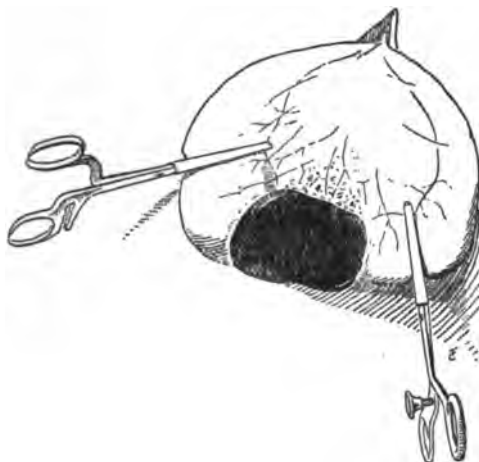gangrenous femoral hernia, as in Fig. 10.

Fig. 10. *Enterectomy for gangrenous hernia, by the Author's
forceps.*

The forceps have the advantage that they act at the same
time as intestinal clamps, keep the parts in parallel apposition
for suture, at a convenient distance which can be regulated ;
and they permit any form of suture to be employed with a
minimum of diaphragm. With them, an intestinal resection
can even be done for hernia without an assistant (Fig. 11).

Laplace's forceps lack simplicity and adaptability, and have
not found general favour; and O'Hara's forceps, though of value
for the large intestine, are less so for the small bowel, on
account of the considerable diaphragm which results, and which
has caused death in some cases recorded.

The suture employed is usually of silk or thread. The piece
of bowel excised should be somewhat wedge-shaped ; *i.e.,* more
of the free border should be cut away than of the mesenteric
border, for nutritional reasons. I have employed a posterior
continuous sero-muscular stitch than a continuous stitch
through all the coats, finally completing the first stitch

anteriorly through the remaining sero-muscular coat. This gives a very secure and accurate apposition. Another excellent method is that described by Littlewood, of Leeds (*Lancet*, June 29, 1901). With the parts in parallelism, he separates the mucous membrane from the sero-muscular coat ; stitches the first half of the latter, and excises redundant mucous membrane ; then unites the mucous membrane by a continuous stitch ; and finally utilises the stitch employed for the first half of the sero-muscular coat for completing the second half anteriorly. Recent observations tend to show that one need not fear sewing through all the coats, especially when re-inforced by an external suture ; and by such means we obtain a secure apposition. A nimble hand and mechanical turn of mind are more important than any slavish adherence to some special suture.

ENTEROSTOMY WITH SUBSEQUENT ENTERECTOMY.

This has its particular application in the treatment of malignant growths associated with intestinal obstruction ; for which this method of two-stage enterectomy is the safest of all. There are two types for indication :—In one type, the growth is brought out with a good loop of the bowel, fixed outside by a rod passed through the mesentery, as described under permanent enterostomy ; and a tube put into the distended bowel just above the growth, to relieve the obstruction. The growth is removed later, and an immediate enterorrhaphy performed ; or the artificial anus closed by a plastic extra-peritoneal operation after reduction of the spur. An actual case is illustrated in Fig. 12, representing one of obstruction from cancer of the ileo-cæcal valve determined by median cæliotomy. The involved gut was then brought out in the right iliac fossa and drained just above the obstruction. The photographs show the bowel just before and during the excision which was performed without a general anæsthetic other than an injection of morphia.

In the other type, enterostomy is performed, leaving the growth *in situ ;* and after the patient has well recovered from the effects of the obstruction, the enterectomy is performed. A recent case, in which I first employed my enterostomy tube in the cæcum, and six days after excised about 10 inches of
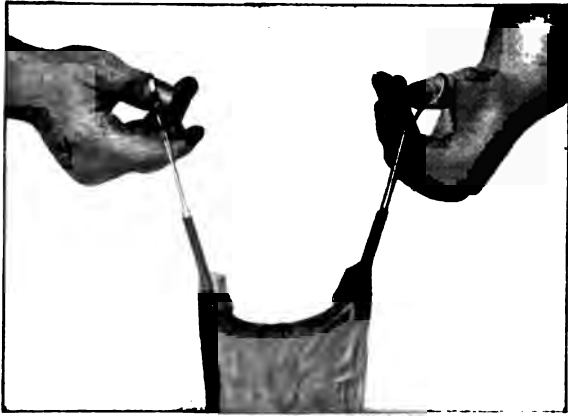
PLATE XIV.

Fig. 11. *Method of using the Author's enterectomy forceps.* (*In the middle figure there are two apposed pieces of bowel close together, though not clearly indicated.*)

PLATE XV.

Fig. 12. *Enterectomy (just before and during the operation), subsequent to previous delivery of growth and relief of intestinal obstruction by enterostomy.*

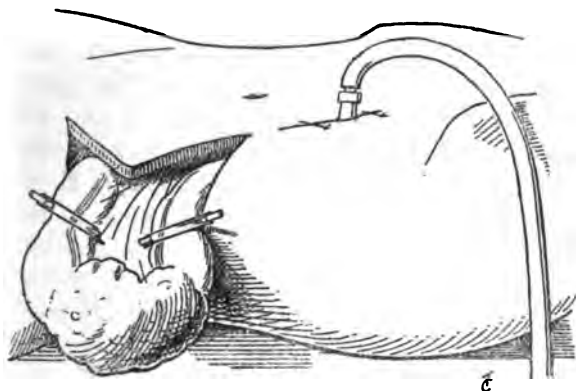the hepatic flexure for cancer, with complete success, is here diagrammatically represented (Fig. 13).

Fig. 13. *Enterostomy for intestinal obstruction by Author's enterostomy tube, followed by intestinal resection six days later.*

ENTERECTOMY WITH IMMEDIATE ENTEROSTOMY.

The mortality of this proceeding is greater when serious intestinal obstruction is present; and, for gangrenous hernia, statistics show a higher death rate than if enterectomy be performed. The operation may be performed in a similar way to that for permanent enterostomy in the first stages, securing as large a loop of bowel as can be conveniently brought out by a glass rod passed through the mesentery. The growth is cut away, and the two ends drained by Paul's tube, rubber tubing, or otherwise (Fig. 14).
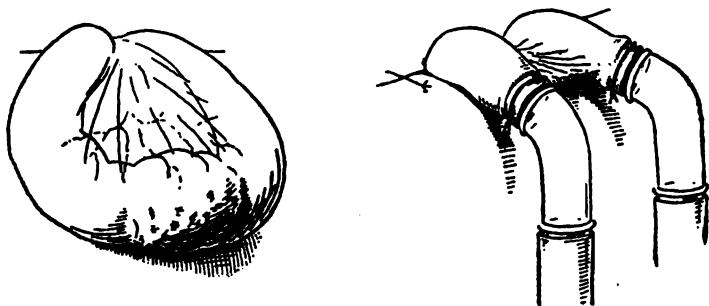

Fig. 14. *Immediate Enterectomy with drainage.*

Later on, the artificial anus is closed by an extraperitoneal operation, first reducing the spur by keeping a piece of stiff

india-rubber tubing anchored within the bowel for a week or two, as originally employed by the late Sir W. M. Banks.

A useful modification of this method has been introduced by Paul (*Brit. Med. Jour.*, 1895, I., 1136). In this, the mesentery is first tied and divided, and the loop of bowel containing the growth is brought well out and the adjacent sides of the divided mesentery and of the bowel sewn together. The part of the bowel containing the tumour is then cut away, and a Paul's glass tube tied lightly into each of the two free ends of the gut remaining (Fig. 15).
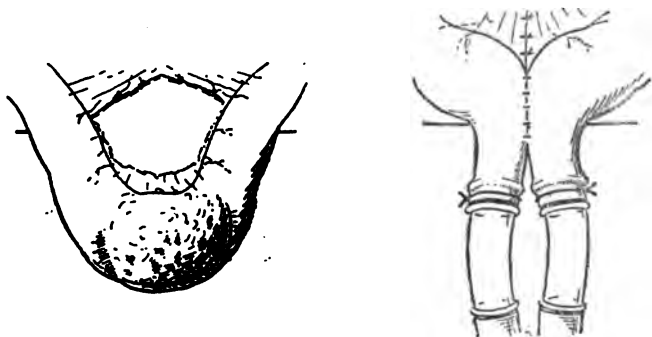

Fig. 15. *Paul's method of immediate Enterectomy with drainage.*

About three weeks afterwards, the double anus is closed by first dividing the spur with clamps or enterotome—a proceeding which takes several days—and an operation for the closure of the anus is subsequently done. The chief advantages of the method are that owing to the division of the mesentery and the mode of suturing, the growth can be more easily and completely brought outside the abdomen, and the subsequent division of the spur can be safely and conveniently carried out. But I am disposed to regard it safer, if the previous method would not sufficiently free the growth, to simply drain the bowel above the obstruction with an enterostomy tube, and excise the growth later on, as was done in the case illustrated in Fig. 13.

SOME AFFECTIONS OF THE CERVICAL SYMPATHETIC.[1]

By PURVES STEWART, M.D., M.R.C.P.,

Assistant Physician to the Westminster Hospital.

[With Plates XVI.—XVII.]

GENTLEMEN,

To most of us the mention of the Cervical Sympathetic recalls memories of our early days of physiological study, and more particularly the memory of a classic experiment of Claude Bernard's upon the rabbit. Unfortunately this is remembered too often merely as a physiological demonstration, and it is, perhaps, not sufficiently realised that the cervical sympathetic is of considerable clinical importance. And therefore I venture to illustrate its practical value by showing a series of cases of lesions in various parts of its course.

First of all, if you will allow me, I will remind you of a few anatomical points. The sympathetic nervous system forms two gangliated cords, hanging like strings of beads, one on each side, close in front of the vertebral column, and extending from the base of the skull to the front of the coccyx. Above, these chains are connected with plexuses that enter the cranial cavity. Below, they converge, and end in a loop on the coccyx.

Each chain is made up of multipolar nerve-cells and nerve-fibres. All of them are involuntary fibres. In addition to its longitudinal fibres, the sympathetic chain receives connecting fibres from the central nervous system. These are named *rami communicantes*, some of them white, some of them grey. They join the sympathetic to the anterior primary divisions of the spinal nerves. The white *rami*, consisting of medullated fibres, pass from the spinal cord to the sympathetic ganglia. They are all efferent in function and leave the cord through the anterior nerve-roots. The grey *rami*, consisting of non-medullated fibres, start within the sympathetic chain itself and, like the others, join the spinal nerves. Some of them are afferent, going into the spinal cord, reaching it through the posterior nerve-roots; others turn off with the peripheral

nerves and supply involuntary efferent fibres to the skin, which are vaso-motor, vaso-inhibitory, pilo-motor and secretory in function.

In addition, the sympathetic cords give branches, either directly or through the great pre-vertebral ganglia (the cardiac, solar and hypogastric plexuses) to the various glands and viscera of the body, to the heart and blood-vessels, to the genital organs, and to the non-striped muscles of the body generally.

Lastly, the cervical part of the sympathetic chain has very special "oculo-pupillary" fibres, which are clinically of considerable importance. These supply the dilator pupillæ, the non-striped part of the levator palpebræ superioris, and the orbital muscle of Müller, a small bundle of non-striped muscle which lies behind the globe of the eye and bridges across the spheno-maxillary fissure at the back of the orbit. The cervical sympathetic also supplies the submaxillary gland, and, like the sympathetic elsewhere, it supplies fibres to the cutaneous blood-vessels and to the sweat glands of the head and neck.

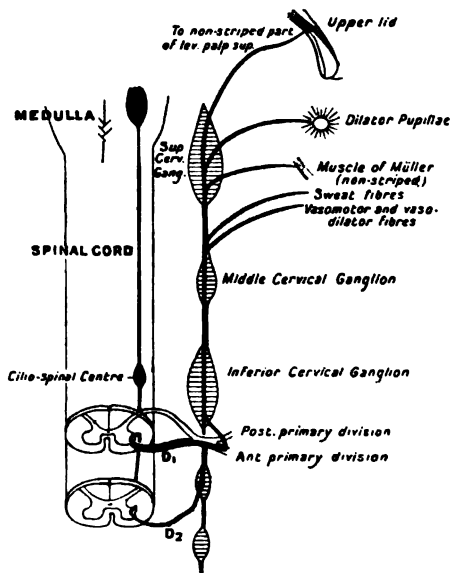The pupil-dilating fibres have a peculiar course which it

Fig. 1.

is important to remember (*see* Fig. 1). Starting from the

PLATE XVI.

Fig. 2. *Paralysis of R. cervical sympathetic from operation-wound.*

Fig. 3. *Paralysis of R. cervical sympathetic from rupture of brachial plexus.*

Fig. 4. *Paralysis of L. cervical sympathetic from tumour at apex of lung.*

Fig. 5.
X-ray photograph of tumour at apex of left lung.

PLATE XVII.

Fig. 6.   Fig. 7.

Showing area of skin supplied by cervical sympathetic, bounded by crosses   Black line on arm indicates boundary of analgesia.

Fig. 8. *Paralysis of R. cervical sympathetic from bullet-wound of lower roots of brachial plexus.*

Fig. 9. *Stimulation of R. cervical sympathetic from enlarged glands at root of neck.*

pupil-dilating centre in the medulla, they run down in the lateral columns of the spinal cord to the cilio-spinal centre in the lower cervical region. They emerge through the anterior nerve-roots of the first and second dorsal segments and enter the inferior cervical ganglion of the cervical sympathetic by white *rami communicantes* at that level. They then run upwards in the cervical sympathetic to the orbit. Therefore ocular and other symptoms may be produced not only by lesions of the ascending fibres of the cervical sympathetic, but also by lesions within the cord, affecting the fibres in their downward course from the medulla (this being remarkably frequent in syringomyelia) or by lesions of the first two dorsal nerves or their anterior roots.

The cervical sympathetic trunk may be injured in any part of its course, from the inferior cervical ganglion at the root of the neck up to the superior cervical ganglion close to the base of the skull. Thus it may be divided by stabs, bullet-wounds or operation-wounds, or it may be compressed by enlarged cervical glands, abscesses, new growths, aneurisms (especially of the aorta, subclavian, common-carotid or vertebral arteries), or even by cicatricial tissue at the apex of a tuberculous lung. Many cases of pulmonary phthisis show inequality of the pupils, either from stimulation or paralysis of one or other cervical sympathetic.

The signs of paralysis of the cervical sympathetic are very characteristic. Here, for example, is a woman (*see* Fig. 2) who was sent to Westminster Hospital with the history that six years previously she had some tuberculous glands removed from the right side of her neck. We can still see the depressed operation-scar along the posterior border of the sternomastoid in its middle third. When she recovered from the anæsthetic she was told that the jugular vein had been injured during the operation. But other structures, including the cervical sympathetic (which lies behind the carotid sheath), must also have been cut, because, ever since, she has noticed that the right eyelid droops a little, that the right side of the face flushes less than the left, and that when she chews, a small patch of excessive perspiration appears below the right eye.[1]

You will observe that the right pupil is smaller than the

[1] The black line indicates the boundary of an anæsthetic area, resulting from division of cutaneous nerves.

left, from paralysis of the dilator pupillæ. Also it does not dilate when shaded. But it contracts briskly to light and on convergence, since the third cranial nerve, which supplies the sphincter pupillæ, is unaffected.

Further, you see that the upper lid droops, making the palpebral fissure narrower than on the other side. This is due to paralysis of the non-striped muscle fibres of the levator palpebræ (inserted into the upper edge of the cartilage of the lid). The voluntary fibres of the levator, inserted into the skin of the upper lid and supplied by the oculomotor nerve, are unaffected, and the patient is still able to elevate the lid voluntarily to its full extent. This, therefore, is not a true ptosis, but a *pseudo-ptosis*.

You also notice that the right eye has sunk back somewhat into the orbit, owing to paralysis of the non-striped orbital muscle of Müller, which normally keep the globe pressed forwards. This *enophthalmos* narrows the palpebral fissure still more. The difference in antero-posterior position between the two eyes is seen best if we make the patient lie down, and then, standing behind, look down at the forehead and eyeballs from above.

I should also mention that the intra-ocular tension is diminished on the paralysed side.

These are the "oculo-pupillary" symptoms, and in cases of cervical sympathetic paralysis they are constantly present.

When the cervical sympathetic is paralysed it no longer responds to stimulation. There are two clinical ways of stimulating it. One is by pinching or pricking the side of the neck, when we produce a dilatation of the pupil on the same side. This "*cilio-spinal reflex*" is abolished in cervical sympathetic palsy. Another method of stimulating the cervical sympathetic is to drop a few minims of a solution of cocaine into the conjunctival sac. The result is that the pupil dilates, the upper lid retracts, and the eyeball is slightly pushed forward. In this patient cocaine produced no such effect on the paralysed side, though it acted normally on the eye of the healthy side.

This patient also told us that when her face flushes, it does so only on the healthy side. Moreover, on the affected side her face does not sweat, except in one little patch below the orbit, and this sometimes sweats spontaneously when she

chews. To verify this point, we made her sweat profusely by means of pilocarpin hypodermically, and found that the right side of the face remained dry, except in a small area below the inner canthus of the eye. This survival of a little oasis of sweat on the dry side may perhaps mean that a small twig of the sympathetic has escaped injury and sometimes functionates excessively.

In this connection I may also mention the case of a judge whom I saw, who had similar localised hyperidrosis in the right temporo-masseteric region whenever he chewed his food. This symptom came on three years after an operation in the neck for a deep-seated parotid abscess. The deep cicatrix in that case probably implicated the cervical sympathetic, so that during the movements of mastication the scar dragged upon a branch of the nerve and stimulated it.

So much for lesions of the sympathetic chain itself. But the oculo-pupillary and other fibres may also be damaged low down, between the spinal cord and the inferior cervical ganglion. Here is the photo (Fig. 4) of a boy of 17 who had felt a tingling sensation down his left arm for several months. A few weeks before I saw him, he noticed that a swelling had appeared in the lower part of his neck on the same side. At a glance you see that the left cervical sympathetic is affected. There is pseudo-ptosis, there is myosis and there is enophthalmos. The left cheek is a little fuller than the right. The cilio-spinal reflex was absent on the left side. On examining the root of the neck we found that the left clavicle was bulged forwards at its inner end, the fossa behind the sternomastoid being obliterated. Further, there was percussion-dulness all over the apex of the left lung, front and back, with diminution of breath-sounds and of vocal resonance. There was also a strip of slight blunting of sensation to touch and pain, all along the inner side of the left upper limb, reaching as far as the wrist, and corresponding with the area supplied by the sensory fibres of the first and second dorsal nerves. Moreover, there was slight wasting of the hypothenar muscles of the left hand, supplied by the anterior root of the first dorsal nerve. The skin of the left hand was dry, whilst that of the right was moist, and the patient himself noticed that in hot weather the right side

N

of his face sweated alone. The pulse in the left upper limb was smaller than in the right, on comparing the radial, brachial and axillary arteries of the two sides.

All this suggested to one's mind the presence of some solid mass behind the left clavicle, compressing the subclavian artery, affecting the first and second dorsal nerves, and implicating not only their sensory and motor fibres, but also their cervical sympathetic fibres. This diagnosis was confirmed by radiography, which showed very clearly (Fig. 5) a tumour in the apex of the left lung. This tumour rapidly increased in size, compressed the subclavian vein, producing œdema of the left upper limb, and within six months the patient died. No autopsy could be obtained.

Here is another patient (Fig. 3), an epileptic scavenger, who was driving a machine road-brush along the streets of London when he fell off his seat in a fit, and ruptured the whole of his brachial plexus on the right side. In addition to the motor and sensory paralysis of the upper limb, due to the brachial plexus palsy, he shows very beautifully the oculo-pupillary signs of cervical sympathetic paralysis. The right pupil, as you will observe, is smaller than the left; the right palpebral fissure is narrowed from pseudo-ptosis, and the globe of the eye is somewhat retracted. The right cilio-spinal reflex is absent. In this patient, however, the iris still dilates to cocaine, probably because the pupil-dilating fibres entering the cervical sympathetic from the second dorsal root have escaped injury.

The next photo I show is that of a soldier who came under my observation on the voyage home from the South African war. He had been wounded in the neck by a Mauser bullet. At the time of his injury he was lying on his face, firing at the enemy. The bullet entered his neck an inch and a half below the left mastoid process, crossed the middle line in front of the vertebral column, and came out through the seventh right interspace in the posterior axillary line, lodging in his bandolier. He immediately felt a sensation "like an electric shock" all over his body, but especially in the right upper extremity, which became at once totally paralysed. He had hæmoptysis owing to the perforation of the lung, and some difficulty of swallowing for a few days,

probably due to injury of the œsophagus. In about three weeks the hæmoptysis gradually ceased, and the right upper limb recovered power, so that when I first saw him, two and a half months after the injury, he was able to move it freely at all joints. Ever after the accident he noticed that he did not sweat on the right side of the face and neck, nor in the right upper limb.

The photographs show that the patient has an area of slight analgesia (bounded by the thick black line) along the inner border of the right upper limb, corresponding to the areas supplied by the eighth cervical, first dorsal, and second dorsal nerve-roots. He also has slight weakness of the small muscles of the thumb, innervated by the first dorsal root. We also observe that the right cervical sympathetic is paralysed, so that he has contracted pupil, enophthalmos, and pseudo-ptosis on that side.

But there is a special reason why I show you this patient's photographs. It is because they demonstrate a point which, so far as I know, had not previously been mapped out in the human subject, viz., the extent of skin supplied with sweat-fibres by the cervical sympathetic. In the tropical heat to which we were exposed, this patient sweated profusely except in an area on the right side of the head, neck, upper limb, and upper part of the trunk. This area remained dry, and the boundary between sweating and non-sweating skin was sharp and distinct. In order to photograph this, the happy thought occurred to blow powdered charcoal on the skin. This stuck on the sweating side, and blew off on the dry side. We were then able to photograph the non-sweating area, to which the cervical sympathetic should have been distributed. As you will see from the photographs (Figs. 6, 7, and 8), this area, marked by crosses, runs down the middle line of the head and neck, and turns horizontally across the chest at the level of the third rib in front and the spine of the scapula behind, including the whole of the upper limb.

Before leaving the subject of cervical sympathetic palsy, I should mention that excision of the cervical sympathetic has been employed therapeutically in certain diseases. Thus in cases of glaucoma, ophthalmic surgeons have recommended this operation to diminish the intra-ocular tension, and, I

believe, with a certain amount of benefit. Then, some years ago, bilateral excision of the cervical sympathetic was tried for the relief of epilepsy, in the hope of paralysing the cerebral vaso-motor nerves and thereby rendering the brain hyperæmic, especially in cases where fits were ushered in by blanching of the face. But the results recorded have not been sufficiently good to encourage us to recommend this procedure.

Let us now consider very briefly the reverse condition, viz., irritation or stimulation of the cervical sympathetic. The signs are the converse of those which we have seen produced by paralysis, viz., dilatation of the pupil, *exophthalmos* or forward projection of the eyeball, widening of the palpebral aperture (Stellwag's sign) and delayed descent of the upper lid when the patient looks downwards (von Graefe's sign). All these oculo-pupillary changes can be produced, to a certain degree, by dropping into a healthy eye a solution of cocaine, which, as we have already seen, stimulates the cervical sympathetic.

Here is the photograph of a man who had lymphadenomatous growths in many of the lymphatic glands throughout his body. (Fig. 9.) During his stay in hospital, we noticed that quite rapidly, within a day or two, he developed the condition which you can see in the right eye, viz., exophthalmos, widening of the palpebral fissure, and some dilatation of the pupil. A few weeks ago I saw a soldier with an aneurism at the root of his neck who also had these signs in the corresponding eye. If the pressure on the sympathetic continues for some time, the signs of stimulation may pass off and be replaced by those of paralysis. Our lymphadenoma patient, however, died nine weeks after the appearance of stimulation phenomena of the sympathetic, without any change in the direction of paralysis.

I have already mentioned that certain cases of apical phthisis are accompanied by inequality of the pupils, probably due to irritation of the sympathetic by changes in the pleura. And there is a good deal to be said in favour of the view that some of the signs of exophthalmic goitre are explainable as the result of stimulation of the cervical sympathetic.

Enough, however, has been said to show that affections of the cervical sympathetic are not only interesting physiologically, but are also of considerable clinical importance.

A CASE OF LOCALISED EMPYEMA ASSOCIATED WITH THE PRESENCE OF A LEPTOTHRIX.

By PAUL MATHEWS, M.B.,

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[With Plates XVIII.—XIX.]

IN view of the increased attention which has recently been paid to the higher bacteria, the following case may prove of interest.

The case is that of E. M., a youth of 19, who was admitted to ward 31 of the Edinburgh Royal Infirmary on January 6, 1904, under the care of Dr. James, to whom I am indebted for permission to publish these notes.

Patient was admitted complaining of pain of three weeks' duration in the left side. His previous illnesses include diphtheria eight years ago and measles during childhood. He had at the same time broncho-pneumonia, and his chest has always been weak since, and he has had a cough on and off for nearly ten years.

His family history reveals nothing of note except the occurrence of tuberculous caries of the spine in a brother. There is no history of tuberculous disease in any other member of the family.

Patient is a surveyor's apprentice, and his social conditions are satisfactory. His present illness commenced three weeks ago, when he complained of sharp pain in the left side of the chest a little below the nipple. This got worse and he had to stop work, and lie up with it for a day or two. It improved a little, and he resumed work for about a week, but the pain returned and became suddenly worse. He has suffered from his usual cough, which he says is no worse than it was previously, but which aggravates the pain considerably.

On admission patient was a delicate youth of 19, of rather poor musculature. He had a marked flush, but no cyanosis. Temperature 101·4.

Respiratory System.—Patient complains of sharp pain on the left side, most marked just below the nipple, but also felt posteriorly over the base. It is increased on coughing and on

deep inspiration.   Respiration 28 per minute, not laboured.
He has a frequent cough, which is somewhat paroxysmal and is
not suppressed to any extent.   He brings up small quantities
of slightly frothy mucopurulent sputum.

Examination of chest shows it to be rather flat but fairly
well formed.   Expansion is equal on the two sides.   Vocal
fremitus is well marked everywhere, except over the left base
posteriorly, where it is slightly lessened.

Percussion shows slight impairment of note over the left
base posteriorly, and also a rather high-pitched note over the
left apex posteriorly.

Palpation reveals the presence of an area of tenderness
about 3 inches in diameter over the 5th—7th interspaces
below the left nipple.   Percussion causes considerable pain
here, and it is also the seat of pain when he makes any
sudden movement.   The breath sounds are vesicular—rather
harsh in character in front, a trifle weakened over the left base
posteriorly.   Some slight very soft friction can be detected
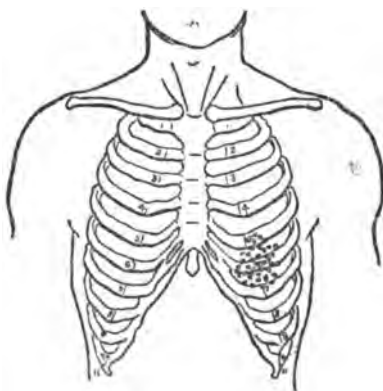over the painful area (*see* Fig. 1).

Fig. 1. *The dotted area indicates the position of tenderness beneath
which the pus collected.*

Sputum examined for tubercle bacilli with negative results.
Other symptoms show nothing of note.

For the ensuing three or four days there was little change
in patient's signs and symptoms.   On January 9 he had an
attack of pharyngitis which subsided under treatment, and his
temperature, which had risen to 101·8° on January 8, gradually

came down to 99° on the 11th, after which it commenced to rise again.

On the 12th a slight diffuse swelling was observed over the tender area. There was no inflammatory redness and fluctuation was absent. Examination of his blood showed a leucocytosis of 12,500. His temperature commenced to swing slightly, but was very irregular. Fluctuation was observable in the swelling on the 16th.

His temperature rose on the 18th to 102·2, and on January 19th, under ethyl chloride as a local anæsthetic, an incision was made into the swelling. About 4 to 5 ozs. of fetid pus escaped. The cavity was explored. It appeared to be shut off from the general pleural cavity and no communication could be found with any diseased rib. A drainage tube was put in.

On the 20th the temperature again rose in the evening, and about one ounce of fetid pus was again evacuated. Thereafter the discharge lessened rapidly and the tube was taken out January 24. The pus obtained was examined bacteriologically and found to contain staphylococci, together with numerous long filaments of leptothrix.

Patient improved rapidly and he was allowed to sit up in a chair on the 25th. The same night, however, he complained of pain over the left base posteriorly and examination showed the presence of an area of very acute tenderness about 3 inches in vertical, and 2 inches in horizontal, diameter over the angles of the 9th—11th ribs. There was no œdema or redness. On percussion (which caused great pain), there was dulness extending out towards the axilla slightly beyond the area of tenderness. Vocal fremitus was absent, and the breath-sounds were distant and faint (*see* Fig. 2). An exploring needle was put into the tender area, and at a distance of about 1½ inches some very foul-smelling, thick greenish-yellow pus was found. This was examined and found to contain numerous filaments of leptothrix, together with several large colonies of the same.

On the following day a needle was put in 2 inches further out, but no pus was found.

On the 29th Mr. MacGillivray made an incision over the 10th interspace close to the edge of the erector spinæ. Pus was not found until an exploring needle had been put in several times. A small pocket of pus was then found about 2 inches

from the surface and somewhat nearer the middle line. The pocket was opened up and a drainage-tube put in. The pus was in very small amount and was foul-smelling and somewhat slimy. Subsequent examination of it showed the presence of leptothrix filaments in it.
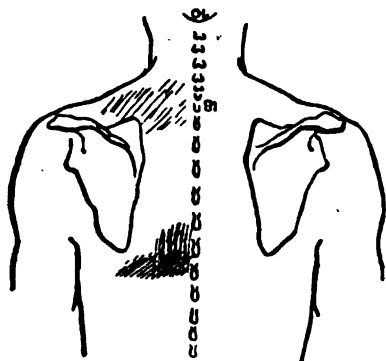

Fig. 2. *The vertical lines indicate the area of tenderness, the diagonal lines, the area of dulness. Over the left base the breath sounds and resonance were feeble. Over the left apex the percussion note was slightly impaired, and the breath sounds were blowing in character.*

Except for a slight rise of temperature on February 1, patient made uninterrupted progress, the discharge was very slight, and the tube was left out altogether after about a fortnight, the wound subsequently healing rapidly. Patient gained 9¼ lbs. in weight, and was sent to Convalescent House, Murrayfield, on February 23. He remained there three weeks, during which time he increased a further 12 lbs. in weight. The wound was quite healed, and patient's general health was excellent.

The organism found in the pus merits further description. The pus obtained was thick and foul-smelling, of a somewhat yellowish-green colour. That obtained from the second or posterior abscess was distinctly slimy, and this fact at first suggested the possibility of the presence of bronchial mucus. It is possible, however, that this slimy character may be due to the organisms present. The pus from both collections showed the presence of numerous small yellowish granules of rather firm consistence. These were about the size of a small pin's head, and were most numerous in the posterior
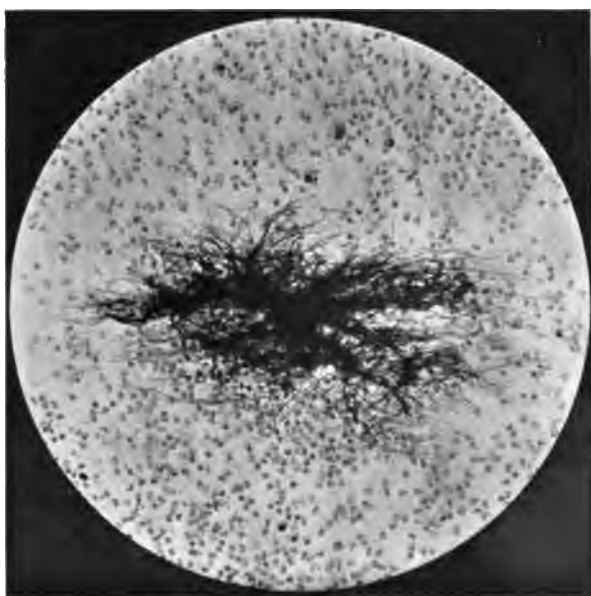
PLATE XVIII.

Fig. 3 *Colony of Leptothrix in pus from E.M., showing felted masses of filaments. Stained by Gram's method.*

Fig. 4. *Edge of same colony, showing irregular staining of filaments.*
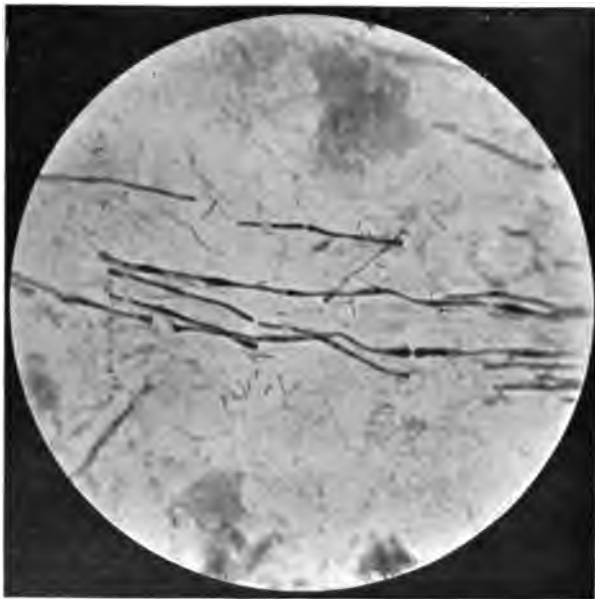
Plate XIX.

Fig. 5. *Filaments of Leptothrix, showing clubbing of the ends. Stained by Gram's method, but imperfectly decolourised.*

collection of pus. Examined microscopically they were found to consist almost entirely of felted masses of leptothrix filaments, together with entangled pus cells, and broken down red blood corpuscles.

The pus from the first or anterior collection showed the presence of numerous fine free filaments of leptothrix and also staphylococci. The pus from the second or posterior collection showed leptothrix, but no staphylococci at all.

The leptothrix organism occurred in both collections in the form of free filaments and in colonies. The filaments were of varying length. These filaments stained readily with the ordinary stains, the stain being retained rather irregularly. By Gram's method the stain was decolourised in most of the free filaments, but there was a tendency to retain it irregularly in some of the colonies. The filaments were not stained by the Ziehl Neelsen method. The filaments, in addition to showing some irregularity of staining, showed some irregular thickening along their length. The ends of the filaments were frequently slightly swollen (see Fig. 5), and where this was the case the ends stained more deeply and had a greater tendency to retain Gram's stain. No branching could be seen.

Attempts were made to cultivate the organism on the following media—agar, bouillon, gelatin, glucose-agar, glucose-bouillon, and fresh slices of kidney. No growth of the leptothrix was obtained in any case. From the pus of the anterior abscess staphylococci were cultivated, but not from the posterior one.

A guinea-pig was inoculated with the pus of the posterior collection with negative results.

The interest of the above case chiefly rests with the organism alluded to as a leptothrix. Without being definitely identified with the L. Racemosa of Vicentini, it presents many points of similarity to that organism.

The clubbing of the ends of the threads has been described by Williams[1] as an early stage in the formation of spores or arthro-spores. No typical " fructification heads," such as he describes, were seen, but all my preparations were mounted in balsam, a medium which Williams states usually destroys these heads. As Williams describes, the clubbed ends stain more deeply than the rest of the filament.

The inability to cultivate the organism is a difficulty that has assailed everyone who has studied the leptothrix.[2]

L. Racemosa is stated by Goadby to be present in the mouths of most people. Williams says it is present in practically all mouths. Though it appears to be associated with caries of the teeth, it cannot be said to have been proved to be pathogenic. It is of interest to note, however, that the above patient had eight or nine teeth extracted for caries (at the root of one of which a small alveolar abscess was found) three weeks before the onset of the pulmonary symptoms. It does not appear improbable that he may have inhaled some of the carious débris during the extraction, and that the leptothrix may have thus gained entrance.

The case does not afford sufficient data to decide the question whether the leptothrix was actually pathogenic or merely saprophytic. The presence of staphylococci in the pus of the anterior abscess leads one to suspect that a staphylococcus was the original pathogenic organism. On the other hand no cocci were found in the pus of the posterior collection. I have not been able to find any reference to the occurrence of leptothrix in empyema as a saprophytic organism.

REFERENCES.

[1] Williams; *Dental Cosmos*, 1899.
[2] Goadby: In Smale and Colyer's *Diseases and Injuries of Teeth*.

ETHYL CHLORIDE AS AN ANÆSTHETIC IN GENERAL PRACTICE.[1]

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HAVING often been asked by general practitioners my opinion of the suitability of ethyl chloride as an anæsthetic in general practice, a few remarks on this subject may not be devoid of interest. There is perhaps but little new to say, for most are doubtless familiar with what has been written upon this subject. I shall therefore have to rely on my own practical experience of ethyl chloride.

This experience is considerable, for since the summer of 1903 I have used it in a large number of cases in private practice and constantly at the London Hospital and at the Royal Dental Hospital. I have given it to every variety of case, and in every variety of way, to old men and maidens, young men and children, infants and aged women.

Little need be said about the history of ethyl chloride, but there is one important point we should all remember, viz., it is on record that even in skilled hands death under ethyl has occurred suddenly and unexpectedly. I refer to this because, with much familiarity, one becomes so charmed with its action as an anæsthetic, that one may easily under-estimate its lethal power.

Ethyl chloride ($C_2 H_5 Cl.$) is a colourless, very mobile liquid, is very volatile, and boils at $55°$ F. It has an agreeable smell, and on inhaling a breath or two a pleasant feeling of exhilaration is experienced.

What are the capabilities of ethyl chloride in general practice ? Before deciding this point we must learn what the requirements of the general practitioner are for an anæsthetic, and I hope further light will be thrown on this point in the discussion. I suppose, I may take it, that to satisfy him the

[1] Read at a meeting of the Winchester Division of the British Medical Association.

agent must be portable, of stable composition, safe, easy of administration, not requiring elaborate preparation beforehand, rapidly acting, and providing, if necessary, a narcosis of several minutes after removal of the inhaler—a narcosis which shall be quiet and sleeplike, and not necessitating close watching after a safe dose has been administered, and an agent giving an anæsthesia which shall not be followed by dangerous or unpleasant after-effects. Ethyl chloride fulfils most of these conditions, provided it be administered with care and discrimination, and provided the administrator be a keen observer and quick to notice the finest shades of difference in the condition of his patient.

Ethyl chloride is certainly portable. A small bottle contains enough to anæsthetise twelve ordinary cases, yet it is but 7 inches high and 1½ inches in diameter. Its composition, if properly stoppered, and kept cool and in the dark, is practically stable. I always use Duncan and Flockhart's preparation, believing it to be the purest. It is relatively safe, that is, there have been few recorded deaths in many thousand administrations, but its action is so extraordinarily rapid—startlingly rapid in some cases—that, unless it be administered with the greatest caution in those cases, it would be most easy to give an overdose.

One full dose of ethyl chloride provides an available anæsthesia of at least two minutes, an anæsthesia which, if complete muscular flaccidity be not required, is, I think, ideal, and after which unpleasant occurrences are not common, if proper precautions be taken. But if, on the other hand, complete muscular flaccidity be required, the anæsthetic must be pushed to the limit of safety, and although one gets a longer anæsthesia, bad after-effects are more likely to follow.

I have said so much in favour of ethyl chloride that a wrong impression may be created, unless its limitations are pointed out. They are that it is unsuitable for long operations, because not only does it produce anæsthesia rapidly, but it is also very rapidly eliminated, consequently it is very difficult to maintain a proper even depth of anæsthesia, and, unless this be attained, an undue strain is thrown upon the automatic vital centres. If it were used for long operations the cost would be considerable, and it would require the undivided attention of

an expert administrator, so that at any rate one man could not administer the anæsthetic and operate at the same time, which is often necessary in general practice in the country. Not only this, but the after-effects vary in direct proportion to the length of the administration, and after large doses faintness or more serious cardiac depression is likely to be met with.

We now come to the administration itself—first, with regard to the inhaler. So many new inhalers have recently been placed upon the market, each claiming to be the best, that it is difficult for the uninitiated to decide which to purchase. After using a variety of inhalers, I recommend above all others Carter Braine's modification of Ormsby's inhaler. My reasons are, that if you give ether at all it is probably this inhaler you already have, if not, I think it ought to be; one does not want to multiply one's apparatus any more than can be avoided, and with the inhaler referred to any anæsthetic could be given. The intrinsic advantage of the inhaler is, that its air-way is so wide that there is absolutely no obstruction to respiration, if you insert your sponge properly—and a great deal is involved in this. The following points are worth remembering :—

1. Character of sponge; it should be of the honeycomb variety.
2. It should be unbleached, because when wet it does not lose its rigidity or elasticity — it is true that the bleached sponges look prettier, but directly they are wetted with anæsthetic fluids they collapse, and there is great difficulty in breathing through them.
3. It should be cut so that the channels run parallel with the long axis of the inhaler, and the patient then respires through a series of tubes bathed in the anæsthetic fluid.
4. It should not fit the inhaler tightly so as to compress its channels.
5. It should be well wrung out in warm water before use so that all its cells fully expand.
6. It should be so placed in the inhaler that all the foregoing points have full play.

Some have objected that if one uses the Ormsby, one " crowds on " the anæsthetic too much, but please note that I

have not suggested that one should put the full dose *on the sponge* and clap the inhaler upon the face suddenly ; this would of course be bad practice, and those who raise such an objection are lacking in imagination, and show a want of resource in the use of apparatus. The proper way to use ethyl chloride in an Ormsby is to apply the anæsthetic not *on* the sponge but *beyond* it ; in this way the vapour is screened from the face by the sponge, and does not come over too suddenly, it does not freeze solid, as is usually the case if merely sprayed on the surface of the sponge, where it evaporates very quickly. Then do not *clap* on the inhaler, but apply it gently to the bridge of the patient's nose, at an angle away from the face and with the air valve open, then by degrees shorten this angle and, when the inhaler properly fits, gradually close the air valve. The face-piece meanwhile should be supported and closely applied by the aid of the little finger of the hand holding it being placed under the chin. Experience will soon teach you how rapidly these manipulations may be carried out. Suffice it to say that one can so anæsthetise a child that it will neither hold its breath, cough, nor struggle from beginning to end of the administration, and yet one will not have lost by evaporation so much of the anæsthetic as to require a second dose. Of course if the drug be too suddenly applied any patient may cough or struggle, the struggles being usually struggles for air, and not mere struggles from excitement, for the breath is taken away by the pungency of too strong a vapour.

2. *Preparation of the Patient.*—This naturally need not be as elaborate for an operation in minor surgery as for one in major surgery, but do not be misled by statements to the effect that *no* preparation is required—merchants of ethyl chloride or its mixtures, particularly the latter, attempt to make capital in this way ; if the stomach, bladder, or bowels be full at the time of the administration, they are very likely to empty themselves reflexly either during or immediately after the administration.

3. *Posture.*—Almost any posture is safe so far as the anæsthetic is concerned, but remember that small children are best anæsthetised in the recumbent position—they are apt to collapse into a heap in the chair if the administration be conducted therein. Also remember that children prefer to sit

while being anæsthetised—they are less frightened than if laid down—one can always let them sit for the first few breaths and as soon as the higher consciousness is lost, lay them down. Remember, moreover, that the pain of fear is worse than any physical pain, and that the less a patient is, from youth, amenable to reason, the more is he susceptible to fear—therefore deal tenderly with the little ones. But if you must anæsthetise a patient in a chair, place him so that there is no obstruction to respiration and no fear of obstruction occurring during the administration, that is, he should be made to sit upright with the head erect on the spine, so that the floor of the mouth is horizontal, for if the head be thrown back, in the favourite position with dentists and barbers, the neck muscles are put on the stretch, and the trachea becomes pressed upon in consequence, and there is a risk of the respiration becoming obstructed. Not only this, but any saliva, blood, or other fluids gravitate backwards and are either swallowed or inhaled, in the former case giving rise to subsequent vomiting and in the latter to laryngeal spasm. If, on the other hand, the head be tilted forwards, the chin is apt to press unduly upon the trachea and cause respiratory embarrassment. In either case serious cyanosis, &c., will result, and with the head thrown back "false stertor" is heard early in the anæsthesia, before the patient is fully anæsthetised, which may lead you to misjudge the depth of anæsthesia and stop the administration too soon.

4. *Dose.*—This depends upon what operative procedure you wish to do, and upon the weight and fitness of your patient. Always dose according to weight, I mean that a big, heavy person will require more—other things being equal—than a small thin one; allow more for alcoholics and smokers and those who are intemperate in anything, and allow less for the anæmic or breathless person. A good average dose for an average adult is 5 c.c.; but of course the dose will vary with the degree of dilution, and if the face-piece do not fit accurately there will be considerable admixture of air, and the patient may require a further dose, or you may be unable to obtain a satisfactory anæsthesia at all. It is better to give a full dose and rapidly induce, allowing no admixture of air, beyond that which is already in the inhaler, than it is to economise the drug and make up for smallness of dose by prolonged rebreathing.

5. *After-effects.*—These vary in direct ratio to the amount of rebreathing to and fro allowed, also on the amount of previous preparation, and to some extent the dose—after large doses, or prolonged administration during which much rebreathing has been allowed, shock and faintness are likely to be met with. Another important point is the after-treatment, for instance, if a patient be moved too soon he is more likely to suffer from vomiting and headache, but if he be allowed to remain in the recumbent posture for a quarter of an hour, or more, after the administration, he is less likely to have unpleasant after-effects. My average at hospital among all classes of patients is that about three in twelve have after-effects ; many of these, however, come to hospital soon after a meal and otherwise unprepared. In private practice vomiting is quite uncommon.

6. *Clinical Signs.*—Provided that the administration be conducted in the way I have described—that is to say, that no outside air is admitted to the inhaler after the air valve has been closed—the following signs are observed :—

(1.) Breathing deepens and becomes more rapid — this alteration in the character of the breathing affords a most valuable guide as to the degree of anæsthesia attained, and results, I think, not so much from the action of the ethyl chloride *per se*, as to the restriction of oxygen—the oxygen originally in the inhaler being soon used up—with consequent stimulation of the respiratory centre. (2.) A little later one feels by the finger under the patient's chin some vibratory movements of the larynx, and a moment later still, these vibrations become more and more audible until (3.) the characteristic laryngeal stertor is observed. At this point the administration should be stopped, *i.e.*, if the stertor be *true* laryngeal stertor and not due to faulty posture, causing obstructive or *"false"* stertor. (4.) About the same time that the breathing deepens, the patient's colour improves, and the face becomes suffused and he looks à pretty healthy pink colour. There is some controversy as to whether the blood-pressure is raised or depressed during the induction of anæsthesia. I incline to a middle opinion, viz., that at first, owing to the increased force and frequency of the pulse, which is observed in nearly all cases, the pressure tends to rise, but almost at the same time

there is some vasomotor paralysis in the cutaneous vessels, these accordingly dilate to a considerable extent and thus the pressure is equalised or even tends later in the course of the administration to fall. But this dilatation, which causes the suffusion of the face, also causes perspiration in many cases, and in others, again, considerable bleeding from the wound, especially after the removal of adenoids and tonsils, particularly if the anæsthesia has been pushed and the vasomotor paralysis thus increased. I do not think it matters much in actual practice whether the pressure rises or falls, for, in the event of any accident happening, one has no time to waste over examining the pulse. It has been established that ethyl chloride kills, not by paralysing the heart, but by paralysing the respiration—the chest becoming fixed in over expansion ; thus in restoring a patient who has been overdosed, nitrite of amyl, for instance, would be useless. (5.) About the same time or a little earlier than that at which the first tracheal stertor has been noticed, and a little later than that at which the face becomes suffused—usually from 40 to 50 seconds—the globes of the eye become fixed, often after some preliminary nystagmus, and usually in the position of convergent squint downwards. (6.) A moment or two later the pupils dilate, and if the anæsthetic be not now removed (7.) the light and the corneal reflexes disappear, the pupils becoming very dilated and fixed. If air be now admitted and the anæsthesia be lightened or continued in a lighter stage, the pupils again contract, but I have seen in several cases, even after the corneal reflex has returned, the pupil remain wide and insensitive. I do not know how to account for this, any more than I can explain why, in yet a few other cases, the pupil does not dilate, even although the patient be deeply anæsthetised. These irregular cases only again impress upon us the necessity for considering all the points of available evidence before making up our minds as to a patient's condition. To repeat, although in about 90 per cent. of cases the signs of deep anæsthesia are :—

> Stertor,
> Fixity of the globes, and
> Dilated pupils with loss of ocular reflexes,

yet these signs must not be taken as invariable, and one must

o

always be on the watch for unusual symptoms. As a rule there is but little salivation during induction, but often one meets with profuse secretion of saliva for no obvious reason, this is a point worth remembering in arranging the patient's position.

It is never wise to push the anæsthetic in the case of fat subjects. They bear deprivation of oxygen badly, and are more likely to suffer from shock ; also their respiratory passages are as encroached upon by fat overgrowth on the inside as are the skin and cutaneous tissues, and the air-ways are more likely to become occluded.

Never administer ethyl chloride without first placing a wooden dental prop between the teeth—this not only keeps the air-way free, but is also a safeguard in case one may have to insert a Mason's gag to expedite means of resuscitation.

Some anæsthetists have stated that ethyl chloride is unsuitable for certain special operations, *e.g.*, for breaking down joints and for setting fractures, &c., because they say they cannot obtain complete muscular flaccidity ; but I think this is merely a question of degree of anæsthesia, and that, if the anæsthetic be administered without a free admixture of air, and be pushed to fixity of the globes, dilatation and fixity of the pupils, with stertorous breathing and loss of corneal reflex, there will be complete muscular flaccidity in the vast majority of cases.

With regard to contraindications, in the following conditions ethyl chloride should not be administered :—Diseases of the larynx, inflammatory lesions and tumours in, or adjacent to, the respiratory passages ; goître ; all conditions giving rise to urgent dyspnœa ; and in long operations.

Time will not permit of my mentioning other points ; *e.g.*, treatment of dangerous symptoms, &c. ; its use with other anæsthetics ; and for long and for special operations, especially tonsils and adenoids, except to remind you that in these last the risk is increased if the coughing reflex be abolished, and that under ethyl chloride this occurs very rapidly.

RHEUMATOID ARTHRITIS : SOME OBSERVATIONS ON ITS TREATMENT.

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IT will not be denied by many that the various methods employed in the treatment of what is usually termed Chronic Rheumatoid Arthritis, are in the main unsatisfactory. The reason for this is not difficult to find, for we have to deal with a disease the causal conditions of which are not very well known, and which shows, moreover, a marked tendency to be steadily progressive, and is aggravated by occasional exacerbations of acute and more rapid extension. Whether a micro-organism is or is not the etiological factor is doubtful. It seems certain that we cannot associate the diplococcus of rheumatic fever with rheumatoid arthritis, although an organism of a different nature has been demonstrated in the joints in a certain number of cases. Into a discussion of the pathology of the disease it is not, however, my purpose to enter ; but one may, in passing, remark that there is reason, afforded by the widespread character of the disease, for the surmise, that some toxic influence, conveyed by the blood-stream, is at work ; and, in view of the success which follows the line of treatment I am presently to indicate, one may perhaps not be wrong in making the conjecture that the source of the toxicity may possibly be referred to the alimentary canal.

While acting as house physician to the late Dr. G. W. Balfour, at Chalmers Hospital, Edinburgh, in 1893, it was my privilege to treat several cases according to the method laid down by him ; and, from an experience lasting over 10 years, during which time 1 have treated a considerable number of patients in various stages of the disease, I am able to state that no treatment of which I have knowledge can compare, in successful results, with what one may call Dr. Balfour's method of treatment.

To him must be attributed the credit of systematically and clearly indicating a line of treatment which has proved most beneficial ; and my purpose in this short note is to confirm

his results, and to make his method more widely known. The experience of others, who may make use of the method, may be added to mine ; and I feel assured that, if the patients under treatment will loyally carry out the directions given them, and that for a sufficient length of time, they will not be disappointed in the results.

Dr. Balfour himself was convinced that he could practically always arrest, and often cure the disease, and that failure was, more often than not, due to the patient's faulty carrying out of orders.

It is convenient to consider this method as falling under three heads, viz. : treatment by 1, diet ; 2, internal medication ; and 3, counter-irritation.

It would appear that these three ways of combating the disease must be used in combination, as the omission of any one of them results in the patient failing to make headway against the malady. On the other hand, if all three are steadily employed together, the effect is usually highly gratifying.

1. *Dietetic.*—The object aimed at is in brief to give a diet which is easily digested and assimilated, and not likely to cause any gastric or intestinal fermentation ; and in addition, all red meats, including mutton and beef, are abolished from the diet list, as they undoubtedly do harm in rheumatoid arthritis. White meats and white fish only are allowed. These are cooked by boiling, roasting, grilling, or, in the case of fish, by brandering. No foods stewed in fat are permitted, because of the difficulty offered by the fatty envelope to the gastric juice reaching the tissue to be digested. Further, as sugar, and in particular beet-sugar, very readily undergoes fermentation (and nowadays beet-sugar is pretty generally used by the public), this substance must be forbidden, and its place taken by saxin. For a similar reason, potatoes, turnips, head of cauliflower, peas, and beans should not be allowed in most cases. With regard to tea, a beverage which most patients do not care to dispense with, the ordinary method of infusion in boiling water is prejudicial, on account of the presence of free tannin, which is extracted in greater or less degree by the process of infusion. There is no objection, however, to tea if it be infused in boiling milk, because the tannin then enters into an association with the albumen of the milk and forms a bland,

non-astringent, and innocuous combination. The tea is infused in boiling milk for 15 minutes ; half a cupful of this infusion is poured out into the cup, which is then filled up with boiling water. Saxin is added, if it is desired to sweeten the tea. Coffee and cocoa similarly prepared may be used. Well boiled porridge is good, and with it can be taken milk, or milk and cream. Eggs lightly boiled, scrambled, or poached can be taken by some patients without injurious effect ; while others find them unsuitable. Milk puddings prepared without sugar, clear soups, maccaroni and milk soup are permissible.

Patients on such a diet do not necessarily become ill-nourished and thin ; indeed they may even fatten. I have seen some, who, after using this diet for a time, have discontinued it, get worse, when they resorted to eating any and all kinds of red meats.

With regard to stimulants, alcohol in moderate amount is neither beneficial nor the reverse in its influence on the course of the disease ; but should it for any reason appear to be essential to the patient's well-being, whisky may be ordered in properly regulated quantity.

2. Internal Medication.—This consists in the exhibition of arsenic and iron in small doses for the period of three weeks out of every month. The action of arsenic is, in the first instance, stimulant to gastric and intestinal digestion whereby it increases the appetite ; secondly, it increases the activity of the tissues, and as a consequence favours a better assimilation of foodstuffs ; and thirdly, it causes an increase in the amount of red marrow in the bones, and so improves the condition of the blood. The addition of a little iron is found to be beneficial. The following combination has been found useful :—

 ℞. Liq. Arsen. Hydrochlor.   -   -   ʒj—ʒij.
   Vin. Ferri Citratis -   -   -   ad ℥iij.
   Sig.   **M.**

One teaspoonful in water thrice daily after meals.

Naturally, the patient must be under careful observation while arsenic is being given, and if any untoward symptoms appear indicative of excessive administration of the drug, it must be at once discontinued. Cod-liver-oil is decidedly advantageous in cases where it is well borne.

3. Counter-irritation.—This is most usefully carried out by the employment of blisters. Each large joint has applied to it

a blister once in every 7 or 10 days, and I find the "emplastrum canthos" the most certain and constant in its action. The size of blister employed for these large joints is 1 inch square. Small blisters may be applied to the smaller joints, or iodine may be painted on the skin in place of a blister, though the latter is certainly the more efficacious. The counter-irritant is applied at different areas all round the affected joint. One begins where the greatest pain and swelling exist, and selects on each occasion a fresh area of skin as yet unblistered. Here again careful observation of the urine is necessary, and the occurrence of albuminuria will constitute a contraindication.

This treatment should be conscientiously pursued for two, three, or more years, according to the extent and severity of the disease ; and one can say that by its means the disease can be arrested, and in many cases actually cured.

After a successful result is attained, as evinced by disappearance of swelling, freedom from pain, regaining of power of locomotion, and movement of the joints, the diet should still be unaltered, and arsenic and iron ought occasionally to be taken. It is perhaps not necessary to state that one cannot hope to cause diminution in size, or removal of the osseous outgrowths, which occur in the bones entering into the formation of the joints' involved. Only the synovial increase and fluid effusions can be removed. But at the same time it is clear that no further osseous increase takes place, so long as the patient follows out the details of the plan laid down for his relief.

These then are the essentials of treatment by which I believe we can greatly benefit sufferers from this serious disease.

It will be observed that the individual parts of this treatment are not new ; they have all been employed at different times ; but what is not so very generally known is that, by a combination of them, we have a highly serviceable means at our disposal for treating a formidable ailment.

Still, while believing that most cases of rheumatoid arthritis require little more than these measures for their satisfactory treatment, I readily concede that other remedial agencies are of service ; nay more, may be very valuable for the alleviation of intercurrent symptoms ; but they are never, in my experience, curative. Among these agencies, I would refer to potassium

odide, sodium salicylate, guaiacum, ichthyol, external anodyne applications, and the employment of electricity, especially electric baths and currents of high frequency. The benefit conferred by them is unquestionable, but it is temporary.

With regard to baths and mineral waters, these no doubt are of much service ; nevertheless, it seems to me quite possible to treat cases without their aid ; and this is an advantage when one is dealing with patients whose circumstances do not permit of their going to a spa for their treatment.

I may be permitted to cite briefly a few illustrative cases which bring out the points I have been referring to.

Case 1.—Male, age 42. When first seen, he had suffered for several years from stiffness and swelling of his joints until he had gradually become incapacitated for work, and was constantly confined to bed.

His temporo-maxillary, knee, ankle, elbow, and wrist joints were extensively involved, being greatly enlarged by reason of soft, puffy swellings of the synovial membranes in association with fluid exudation. On passive movement the joints creaked and grated. The muscles were atrophied above and below the joints. There were no marked osteophytic outgrowths, nor any considerable degree of contracture. The little joints of the fingers were also markedly involved. For three years he faithfully carried out his instructions.

After a year he began slowly and steadily to improve, his joints gradually regaining their natural size and appearance, becoming mobile and free from pain, so that ultimately the patient became able to walk as many as six miles, and actually to cycle.

He has remained well, and may be considered cured.

Case 2.—Female, age 39. This patient was a cook, and had a history and presented clinical features similar to Case 1. She was treated for a year with marked benefit, in so far as she gradually became able to get out of bed and then to walk with the aid of two sticks. She passed out of my care when she was admitted into a charitable institution ; and although she was intermittently treated by blisters and iodine externally, and arsenic internally, this regimen was not constantly carried out, nor did she have the kind of diet already indicated as essential. The subsequent course of her disease tended to be steadily downwards ; her joints became seriously involved

again, till disorganisation appeared, and she died four years later of pneumonia. Prior to her death she was absolutely helpless and bedridden from articular affection.

This case exemplifies the effect of omitting one or more of the elements necessary for the attainment of a successful issue.

Case 3.—Female, aged 50. This patient had suffered for three years from the mono-articular variety in the right hip. There was considerable osseous increase around the edge of the acetabulum. By the end of one and a half years the joint pain had completely disappeared, and the synovial thickening was reduced ; but the inability fully to flex and extend the hip-joint remained, for the osseous hypertrophy was not in any way diminished, though further increase had certainly ceased to occur. The net gain to the patient was arrest of the malady and freedom from suffering.

Case 4.—Female, aged 68. Both knees were here mainly affected, and, in addition, there was slight involvement of ankles and knuckles. She had also physical signs indicative of aortic stenosis. Treatment at once began to cause material improvement, so that by the end of four months the knee-joints were becoming reduced in size. After a year the joints were nearly normal, and the patient felt quite well, and could walk about with perfect freedom.

It is instructive to note that she ceased to think it necessary to continue her treatment, with this result, that the malady insidiously returned, and made such progress that she was again almost as stiff and lame as formerly she had been. But now she has started on a further course of treatment, her disease is showing signs of becoming influenced for the better, for the swelling and pain are diminishing, and freedom of articular movement is increasing.

Examples such as these could be multiplied, but these cases will serve to illustrate what can be done.

As the result of my experience, I feel justified in approaching cases of rheumatoid arthritis, not with a feeling of comparative helplessness, but, on the contrary, with the belief that in many of the cases a considerable amount of good can be done in the way of alleviating suffering, preventing deformity, restoring the use of the limbs, and in some cases effecting a cure,

SOME RECENT WORK IN DISEASES OF CHILDREN.

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INFANT FEEDING.

THE influence of defective hygiene in early life upon physical deterioration of the race has attracted considerable attention recently ; and it is admitted that probably in no respect is hygiene more faulty than in the matter of infant-feeding. The evil results of improper feeding during the first two or three years of life are not to be reckoned only by statistics of infantile mortality. It is even conceivable that such figures— appalling as they are—represent far less damage to the nation than is inflicted by the multitude of undergrown weakly persons, who as the result of prolonged malnutrition during the period when development should be most active, namely, during the first two years of life, are henceforth below the normal standard of physical development. As one means of coping with this evil the introduction of municipal milk-depôts has been tried ; the immediate object being to supply the poor with pure milk, suitably diluted and sterilised. This plan has been on trial longer in America than in England, and already reports of its success are accumulating. At Rochester, New York,[1] the mortality in infants under one year has fallen 65 per cent. since the introduction of a municipal milk-supply seven years ago, and the mortality of children between one and five years has fallen 58 per cent.

In France similar work is undertaken by two different classes of institutions, the one the "*consultation de nourrissons*,"— at which the feeding of infants from the time of birth until about the ninth month is supervised by the Maternity hospitals, whose officials see that breast-feeding is used as far as possible —the other the *goutte de lait,* which deals chiefly with hand-fed children in connection with dispensaries, and distributes milk for infant-feeding under expert medical guidance. Of the

infants fed from the *gouttes de lait* 20–25 per cent. die according to M. Variot,[1] who points out that the majority are already marasmic or diseased when they first come under super vision. The municipal supply of milk for infant-feeding, as at present conducted in this country, has recently been criticised by Dr. Carpenter[3] who points out that even healthy infants have digestive peculiarities, and that to supply stock milk-mixtures, according to the age or size of the infant, is not the correct solution of the dietetic problem. Each infant must be considered individually, and although many healthy infants may thrive on stock mixtures, selected with no particular skill, there are many more whose feeding requires special, and sometimes repeated, adjustment before it will suit. "Municipalities," he says, "are no more qualified to preside over infantile dietetics and infantile bowel complaints, which cannot be dissociated, than are the proprietary food vendors." All such milk-supplies should be under immediate medical supervision. In this country also the milk is sterilised, and already a case in which infantile scurvy is attributed to this sterilised municipal milk has been recorded by Dr. H. Ashby.[4] Whether scurvy is likely to be a frequent result or not, there is little doubt that sterilisation of milk is bad. It somehow interferes with its nutritive properties, and perhaps renders it less digestible. On these grounds Professor Ausset[5] has been using Pasteurised milk in the *goutte de lait* of one of the provincial towns in France, and finds that with milk so prepared he can feed infants from the first on whole milk, whereas if the milk was sterilised it was necessary to dilute it until the infant was four months old.

Some important observations were recently made by Drs. Robertson and Mair[6] on so-called "sterilised milk" supplied from an Infants' Milk Depôt by the Leith Corporation. They found that only 15 per cent. of the bottles examined failed to yield some growth of bacteria. The term "sterilised" may therefore be wrong and misleading, and if it leads to neglect of keeping the municipal milk is as cool a place as possible, the mere term "sterilised" may do harm.

If the municipal supply of milk for infant-feeding is open to objection on the grounds mentioned above, it is to be hoped at least that it may ensure the purveyance of cleaner milk than these infants would otherwise obtain. That the use of clean

milk is a weighty factor in success in infant-feeding seems to be shown by the recent observations of Park and Holt[7] in New York, who found that, amongst the poor class living in tenements, infants who were taking cheap "store-milk," and were suffering with prolonged diarrhœa, were in several instances promptly cured by simply substituting clean milk for the previous food after an interval of no milk ; and from a small series of observations on infants fed on the best milk, which was supplied in sealed bottles, and modified in the ordinary way at home, they concluded that with the cleanest milk from the best-cared-for cattle, the smallest number of bad results occurred. This conclusion was in agreement with their general finding that the most important factor in securing good results was not so much the particular variety of milk used as the exercise of intelligent care by the parents. Under this head "intelligent care," they include cleanliness of bottles and teats, clean storage of the milk, and careful preparation of it for each feed, and, moreover, proper clothing, care, and cleanliness of the infant itself. Where the mother would carry out these duties with care, the character of the milk was found to matter much less than had been expected. But perhaps the most interesting of their conclusions was the relation of season to the effects of different methods of feeding. It was found that in the winter the results were almost equally good whether the infant was fed on cheap milk, condensed milk, good bottled milk, milk from central distributing stations, or the breast, but that in summer there were marked differences according to the kind of milk used, the best results being obtained with good milk sold in sealed bottles and modified at home, and with the milk distributed from the distributing stations, where it was supplied in separate bottles for each feed already modified. The authors, therefore, recommend that during the hot months of the year milk should be supplied for infant-feeding from some such institution, supported by municipal authorities, if private philanthropy is not available ; and they point out that the advantages of such provision are chiefly the constant oversight of the child, and the very small scope left to the mother for faulty methods of food preparation.

The supply of a clean and bacteriologically safe milk is

undoubtedly a great desideratum ; but, as Dr. T. M. Rotch,[8] points out, unsuitable modification of pure milk may be almost as disastrous as the use of impure milk. The importance of exact methods, in modifying the percentage of the various constituents, is that only by such methods can we determine intelligently what variations can be employed in the individual case. Precise and unvarying percentages are certainly not necessary in the feeding of the majority of infants, but it is equally certain that there are cases in which even slight variations in the percentages of the various constituents produce effects either good or bad. Perhaps there is no more striking illustration of the insufficiency of theoretical "rule of thumb" than the excellent result, which has been obtained by some observers, from feeding infants, even a few weeks old, with undiluted cow's milk. Fitschen[9] has used milk undiluted as early as the tenth day of life, and states that it is most suitable for infants over the age of four weeks. For infants who have been breast fed, the amount of undiluted milk should be half the quantity obtained from the breast—which can be ascertained by weighing the infant immediately before and after suckling—and although at first some dilution may be necessary, the dilution is rapidly diminished and soon discontinued altogether. Another method of determining the amount of undiluted milk to be used is given by Dr. Haworth,[10] who considers that $\frac{1}{100}$th of the total body weight of the infant represents the amount of milk to be given at each feed. Even more subversive of all the canons of infant-feeding is the use of undiluted topmilk,[11] made by allowing milk to stand in a basin for two hours. This was found to contain 8 per cent. of fat, and yet, in feeds of four ounces every three hours, it caused a wasted infant of nine months to put on weight, and when subsequently tried in 31 cases was found to be very successful.

But although some infants will flourish on almost any modification of cow's milk, correct or incorrect in theory, it still remains true that for the majority more careful modification of milk is necessary, and probably no one constituent gives more trouble than the curd-forming proteid, caseinogen. To avoid this difficulty of digesting curd, dilution is often carried to a degree which renders the mixture too weak to have its proper food-value, or resort is had to peptonisation, which is

objectionable on several accounts. Recently a simple method has been described by Dr. F. J. Poynton,[12] whereby both these measures may be avoided. It has been shown that the addition of sodium citrate to cow-milk renders the curd formed with rennet less dense, and it is found by experience that sodium citrate given regularly with the food has no injurious effect upon infants ; this salt is therefore added to the milk-feeds in the proportion of one grain to the ounce—or if necessary 1½ or 2 grains may be used—and it is found that the digestion of curd is greatly facilitated. Sodium citrate is easily soluble in water, so that the amount necessary for each feed can be prescribed in a drachm of water ; for instance, if a mixture of two ounces of milk with one ounce of water is being used, and a grain of sodium citrate to the ounce of milk is to be tried, a solution is ordered, containing Sod. Citrat. gr. ij. aq. ʒi, of which the nurse is directed to add one drachm to each feed ordered : thus a sufficient quantity can easily be supplied to last several days. The only drawback noticed was a tendency to produce constipation. The method has, of course, its limitations : in particular, it may fail in some of the more pronounced cases of milk-dyspepsia. It is in the mild cases that it has so far been found most useful.

" IDIOPATHIC " DROPSY IN CHILDREN.

Under this heading has been given by A. W. Fairbanks[13] a summary of published cases of œdema, generalised or local, occurring in infancy and childhood without apparent cause. It is clear, however, that in a majority of the cases the œdema was associated with more or less severe illness, and amongst the infants a common association was diarrhœa. In a considerable proportion it supervened on a condition of pronounced marasmus, and in about a quarter of the number there was definite anæmia. These cases of symptomatic œdema, without any evidence of renal affection, are common enough in young children ; far more puzzling are those cases, of which he mentions several, in which children a few years old develop general dropsy, sometimes with ascites, sometimes without, with little or no pyrexia and with nothing abnormal in the urine except that it is of unusually low specific gravity (1004–1010). In most of these cases the dropsy gradually disappears after a

week or two. Some of these attacks have followed after a severe bout of diarrhœa, but in others no such association was noticed, and it seems likely that they are similar in character to the dropsy which has followed scarlet fever, varicella or measles in several cases—a condition which at first sight strongly suggests nephritis, but which is found to occur without any evidence of nephritis in the urine. Such cases can at present only be grouped together as presenting points of similarity in their clinical course. We know nothing of their pathology, and there is little evidence to support the explanation offered by Fairbanks for these, and for the various other cases of "idiopathic" œdema, namely, that the œdema is " produced by a reflex sympathetic disturbance having its origin in a direct exciting cause acting on any portion of the sympathetic system, but producing its effect through the terminal filaments in the vessel walls." But, as De Wolf[14] points out in discussing the œdema which occurs in infants with diarrhœa, it would be rash to assume that the kidneys were necessarily unaffected because the urine was free from albumen. There is evidence that pathological changes may exist in the kidney, and cause œdema, without a trace of albuminuria ; and he would attribute the œdema of diarrhœal diseases in infancy to some infection spreading from the gastro-intestinal tract, and producing changes in the blood and the walls of the blood-vessels, and also in the kidneys.

Of considerable practical interest in this connection are the observations of Potter,[15] who found in several cases of diarrhœa with marasmus and œdema in infancy, that an increase of the proteids in the diet was followed by rapid disappearance of the œdema. Most of the cases had been fed with very dilute mixtures on account of the diarrhœa, and when the proteid was increased from 1 or 1·5 per cent. or less up to 2 or 2·5 per cent., the œdema disappeared, sometimes in twenty-four hours. In none of these cases was there any evidence of renal affection.

GONORRHŒA AND VULVO-VAGINITIS IN CHILDREN.

This has been the subject of much investigation recently ; according to Dr. Kimball[16] there exists in infants a remarkable predisposition to infection with the gonococcus, and this is the

greater the younger the child. In the newly-born the mother
is the usual source of infection, but in older children there is
often no obvious source. Amongst 600 admissions to the
Babies Hospital in New York in one year, there were 70 cases
of vulvo-vaginitis and 10 cases of arthritis due to the gonococcus,
and a large proportion of the vaginitis cases were infected
while in the hospital. In spite of careful preventive measures
the infection reappeared again and again in the hospital; and
it was found that only by complete isolation of infected cases
could the spread of the disease be prevented. If such isolation
is impossible, it is essential that the napkins from an infected
infant should all be sterilised; this measure, however, often
failed, and it was found to be safer to use sterilised " opera
cloth " which could be destroyed directly after use. Dr. Kim-
ball reports eight cases in which pyæmia resulted from gonor-
rhœal infection in infants under the age of three months; seven
were males, one was a female. In six of these cases there was
a purulent polyarthritis; in two cases only one joint, the knee,
was involved; in none was there any urethritis or vaginitis;
only one showed ophthalmia, and this developed after the joint-
affection. A microörganism, thought to be the gonococcus, was
isolated from the pus in the joints in each instance. Six of the
infants died—four during the acute stage, two from marasmus
after the joint-affection had subsided. Three cases were
examined *post mortem*, and all of them showed in addition to
the arthritis some broncho-pneumonia. The route of infection
in such cases is by no means obvious; it suggested that a
gonorrhœal stomatitis — a condition of which numerous
instances in infants have been reported—may be the starting
point, and one of Dr. Kimball's cases seemed to support
this view. The probability of respiratory infection was also
suggested by one case in which infiltration of the trachea was
found, and gonococci were grown in cultures from the mucous
membrane.

Woods [17] considers that the great majority of all cases of
vulvo-vaginitis in children are gonorrhœal in origin, but points
out that the mere finding of diplococci in the vaginal discharge
is no proof of gonorrhœal disease, as several other varieties
of diplococci beside the gonococcus are found in the vaginal
secretion. He refers to cases in which infection was traced to

towels, to a rectal thermometer, and to using a public bath; this last source was considered to have infected 160 persons, many of them children.

That such infection may lead to far more serious results than a mere vaginal discharge and local irritation has been shown by the many cases now on record where not only arthritis but also acute peritonitis has supervened. Dr. Northrup [18] describes two cases in sisters, aged nine and eleven years respectively. Both developed acute peritonitis, which at first was'thought to have originated about the appendix, and accordingly laparotomy was done in the earlier case. Nothing was found beyond extreme injection of the peritoneum and a few drachms of fluid in the pelvic fossa. This patient, and the other, whose abdomen was not opened, both recovered. The vaginal discharge in each case was shown to contain the gonococcus. He refers also to eight cases reported by Comby, all in girls from six to eleven years old, and all showing symptoms of acute peritonitis; in none of these was laparotomy performed, although in some of them it was carefully considered; all made a good recovery. One feature of this complication specially noticed by Comby is the rapid subsidence of the symptoms of peritonitis in some cases which have begun most acutely. But the prognosis is not always so good. According to Galvagno the mortality from gonorrhœal peritonitis in children is about 20 per cent. The same writer points out that in some cases the peritonitis is localised, and finds ten such cases in children recorded. It would seem that the peritoneal inflammation may be chiefly about the uterine appendages, the infection having travelled through the tubes and set up salpingitis, which may give rise to a localised resistance appreciable through the abdominal wall, or perhaps more distinctly by rectal examination. One such case in a child aged six years has been recorded by Mr. L. Bidwell,[19] in which laparotomy was done and the tubes removed as they were full of pus. In another case, aged 3½ years, recorded by Dr. Carpenter [20] the pelvic inflammation detected by bimanual examination subsided spontaneously.

The occurrence of gonorrhœal peritonitis was observed in two sisters, aged respectively 12 and 6½ years, by Sebilleau. Both recovered without operation, and the author emphasises the favourable course which most of these cases run as a reason

for not having recourse too readily to laparotomy. It is note-worthy that in the majority of cases which have been recorded as instances of gonorrhœal peritonitis no evidence of the cause of the peritoneal inflammation is adduced beyond the presence of diplococci resembling gonococci in the vaginal discharge, and considering the great frequency of vaginal discharges in children, and the ascertained frequency of diplococci which resemble gonococci in these discharges, it may be doubted whether the mere association of so common a condition with an acute peritonitis is sufficient evidence that the peritoneal inflam-mation is due to the gonococcus in all such cases. The treatment which has been recommended for gonorrhœal vulvo-vaginitis in children, is, in addition to the prophylactic measures already mentioned, douching with a solution of potassium permanganate (1 in 1,200), or with protargol (2–5 per cent.). Kimball (*loc. cit.*) states that after trying various antiseptic douches he came to the conclusion that protargol gave the best results. After the douching powdered boric acid should be freely dusted over the vulva.

EPIDEMIC INFANTILE PARALYSIS.

Several epidemics of infantile paralysis have been recorded within the past ten years, and their occurrence is generally considered to support the view that "infantile paralysis" is an infective disease due to some specific *materies morbi.* One of the most recent is that recorded by Wade[21] and also by Litch-field,[22] as having prevailed in Sydney during the months November, 1903, to March, 1904—the summer months. The former observer mentions 34 cases, all of which occurred in December and January, the hottest period; 16 were males, 18 were females; the youngest was 13 months, the oldest 7 years of age; 15 of the cases were between the ages of 18 months and 2½ years. The disease began suddenly with fever and vomiting, the most marked symptom was the pain in the affected limbs, tenderness in the muscles was also very marked and persistent, in most cases for three or four weeks, there were only two in which tenderness could not be found; the onset of paralysis varied from the first day up to the fourteenth day. The limbs were affected as follows :—All four limbs, four cases; one arm, both legs, four cases; one leg, both arms, one case; right leg and arm, three cases; left leg and

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arm, two cases; left leg and right arm, one case; both legs, five cases; one leg, thirteen cases; one arm, one case. The face was affected in one case; the abdominal muscles were affected in one case. Four months after the beginning of the epidemic there was some paralysis remaining in some muscles and groups of muscles in every case. One exception should perhaps be made—a child, aged 2 years, who was suddenly seized with fever, vomiting, headache, and pyrexia, which lasted four days, at the same time there was great tenderness of the muscles of the right thigh, and the child was unable to walk. By the sixth day the tenderness had disappeared, and the child was able to walk. Dr. Wade considers this child to have been affected with a mild attack of infantile paralysis, which ended in complete recovery.

Litchfield mentions twenty-five cases which came under his own notice during the epidemic in Sydney; twenty-one of these occurred during December and January. The youngest child was four months old, the oldest six years; the majority were in the second year of life : sixteen were males, nine were females. The symptoms were generally as described by Wade, but pain and tenderness were noted only in " about eight of the cases." In one, these symptoms lasted as long as four weeks. In some of Litchfield's cases the paralysis was the first symptom, no general disturbance being present. Twelve of the children were seen at a subsequent date (within four months after the epidemic began), and all these had some paralysis remaining.

During the early months of 1904 an epidemic was reported from Queanbeyan, New South Wales, by Dr. Blackall,[22] whose clinical picture of the disease, which he had seen within a few weeks, in six cases between three and eighteen years of age corresponds fairly closely with that described by Wade and Litchfield.

The uncertainty which hangs about many of the cases recorded as epidemic infantile paralysis can hardly fail to impress anyone who studies the clinical reports of these cases : and it is noteworthy that while Wade and Litchfield record the epidemic under the heading "infantile paralysis," Blackall terms the epidemic observed by himself "epidemic polyneuritis." No fatal cases occurred, so that none of these three observers were able to determine the pathological conditions.

It may be that polyneuritis and poliomyelitis, either separately or in combination, may be produced by one and the same cause, so that one or the other lesion may predominate in any particular epidemic. In an outbreak which occurred at Poughkeepsie in America, Dr. Chapin [24] considered that some of the cases were suffering from neuritis, and this view was supported by the fact that many of the cases made a complete recovery in 1-4 months, whilst three remained paralysed with much wasting of the affected limbs, and presented the typical appearance of poliomyelitis; moreover, in one case which died, the autopsy showed the characteristic changes of acute anterior poliomyelitis in the spinal cord. But there is another possibility which seems worthy of consideration in such an epidemic as that described by Caverly [25] in Vermont, where the mortality was over 10 per cent.—a death-rate which would be most exceptional in infantile paralysis,—namely, that the disease was cerebrospinal meningitis; and indeed in some of the cases recorded by Caverly the symptoms are strongly suggestive of this, for paralysis was completely absent from the limbs in ome of the cases which showed " rigidity of the spinal muscles, strabismus, or other symptoms referable to the nervous system." In an epidemic which occurred at Gloucester, Massachusetts, in 1900, Painter [26] observed only one fatal case amongst 39 affected, no autopsy was obtained, but the symptoms in the one fatal case were those of cerebrospinal meningitis. An epidemic in Dutchess county, New York, reported by Mackenzie,[27] included cases with symptoms of infantile paralysis, as well as cases suggestive rather of cerebrospinal meningitis.

So far as any bacteriological evidence has been obtained, it would seem to make the distinction between infantile paralysis and cerebrospinal meningitis still less clear. In one case of supposed infantile paralysis, in which lumbar puncture was done by Schultze,[29] diplococci were found in the cerebrospinal fluid resembling the diplococcus of cerebrospinal meningitis, no growth, however, was obtained in culture. In a fatal case in which the lesion in the spinal cord was characteristic of anterior poliomyelitis, diplococci were found in the ventral cornua of the cord by Brooks, and the same observer found diplococci in the blood of another case of supposed infantile paralysis during life; both these cases occurred in the

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epidemic described by Chapin (*loc. cit.*) ; no growth, however, was obtained, and the nature of the diplococcus remained uncertain.

In some of the epidemics, in a certain number of the cases, the infantile paralysis supervened on some infectious fever ; thus in Vienna in 1898 40 cases occurred,[29] five of which followed directly after specific fevers, namely, after measles in two cases, after diphtheria in 2 cases, after scarlet fever in one case. Wade also notes that in the Sydney epidemic out of 34 cases, one occurred during pneumonia, another during measles. The interpretation of this sequence or association is not yet determined. On the one hand there are those who consider that the vascular changes in the cord which are found in anterior poliomyelitis may be produced by various causes. Gossage,[30] discussing the ætiology of this condition, quotes Dr. F. E. Batten as holding the view that "some morbid condition of the blood just precedes the thrombosis, which condition may be due to a number of causes, *e.g.*, recent specific fever, chill, bacterial infection, &c. On the other hand Painter concludes, from his observations on the epidemic in Massachusetts, that, judging from clinical phenomena, we have "as good evidence of the infectiousness of anterior polio-myelitis as we have in scarlet fever " ; and Gossage, who reports two cases of infantile paralysis in a brother and sister, aged respectively seven and five years, where the disease attacked the two children within seven days, concludes from his discussion of the recorded facts, "it is probable therefore that the organism associated with anterior poliomyelitis is specific to that disease, and is not concerned in the causation of any other morbid condition." On this theory the relation of specific fevers to infantile paralysis is explained either by assuming that a " weakened resistance " to the invasion of the specific micro-organism of poliomyelitis is left by the antecedent disease, or else, as Zappert puts it, that the occurrence of any of the specific fevers increases the virulence of some specific micro-organism not yet isolated. It is quite clear that, however strongly the clinical evidence may point to a specific infection as the cause of infantile paralysis, it is certainly not conclusive, and the epidemic occurrence from which most clinching evidence might be expected has by no means settled the question, which remains *sub judice.*

INTESTINAL WORMS.

There has been much difference of opinion as to the rôle of intestinal parasites in the production of various symptoms in children. Like teething, worms have been held to account for a multitude of evils, some with good reason and some with none. On the other hand, there are those who hold that intestinal worms are credited with far more mischief than they really cause, and that they are comparatively harmless. Probably, as usual, the *via media* is the safe one, and there is something more than coincidence in the association which has been noted between many symptoms, nervous and otherwise, with the presence of intestinal worms.

Sigaud (*Gaz. des Hôpitaux*, June 30, 1904) records a case in which a child, aged six years, fell as if in a fit whilst eating his supper. Speech was impaired and the right arm and leg were paralysed. Administration of calomel and santonin resulted in the passing of twenty ascarides; after which the child soon regained consciousness, and the paralysis began to diminish, and had completely disappeared within five days. Burnet[31] records two cases in which chorea occurred in girls who were found to have tapeworm. In both cases after previous treatment had failed to affect the chorea, the expulsion of the tapeworm (it was Tænia solium in both cases) or of the greater portion of the worm, was speedily followed by subsidence of the chorea. In these cases, as in others where Dr. Burnet had observed the association of round worms or thread worms with chorea, there was a history of rheumatism either in the patient or in the family. He suggests that the possible presence of tapeworm should be borne in mind in cases of chorea which prove unamenable to the usual treatment. Symptoms suggestive of meningitis, and associated in one case with some laryngeal spasm, were observed by Pierantoni[32] in two boys, both aged three years, who were found to have ascarides. In both cases there was considerable dilatation of the pupils : one boy recovered rapidly after passing six round worms, the other after passing twenty-four.

Less obscure in their causation, though sometimes serious in their effects, are the mechanical results of round worms. Quite recently a case was reported[33] in which a boy, aged three years, who had suffered with abdominal pain and several

convulsions for a few weeks previously, was suddenly seized with an attack of asphyxia which proved fatal, a dead round worm was found in the trachea. In a child who had been operated upon for appendicitis, the persistence of a fistula for four months was found by Villemin [24] to be due to a round worm which had probably been lying in the fistulous track for many weeks. Whether thread worms produce irritation mechanically, and in this way may cause appendicitis as foreign bodies in the appendix are supposed to do, remains uncertain. The present writer (*Brit. Med. Journ.*, April 15, 1899) pointed out that large numbers of thread worms were often to be found in the appendix in children, and also that in such cases there was sometimes pain localised over the appendix. Heller [25] has recently published similar observations emphasising the frequency of thread worms in the appendix, and states that Metschnikoff found them in the cæcum in 12 out of 17 cases of appendicitis. Heller thinks it is unlikely, however, that the thread worms bear any causal relation to the appendicitis.

Of recent years a view has been put forward that some at least of the effects of intestinal worms are due to toxines in some way produced by them and absorbed into the blood. Cattaneo [26] injected fluid, in which ascarides had been grown, into guinea-pigs, and in every case pathological effects were produced, particularly paralysis of the hind limbs. None of the guinea-pigs showed convulsions. Post-mortem examination of these animals, when killed, showed that the symptoms produced were not due to any pyæmic infection ; but seemed to be due entirely to some poison contained in the fluid in which ascarides had been grown. Cattaneo argues that the production of this poison is a vital phenomenon and therefore the negative results obtained by injection of extracts from the dead bodies of ascarides in no way invalidate his observations. It might be suggested that the changes which have been found in the blood of children affected with worms, point to something more than a mere mechanical irritation ; but such changes are very inconstant, and it is difficult to assign any great weight to them. Boycott (*Brit. Med. Journ.*, November, 1903) made some observations on children with thread worms, from which it appears that in less than half the cases there is a distinct increase of eosinophile leucocytes (a proportion above 6 per

cent.), but he admits that an eosinophilia may occur in children without apparent cause. With ascarides, no blood change was detected, and with tapeworms three out of six cases showed definite eosinophilia. The three which showed no increase of eosinophilia were adults, the other three were children. Boycott suggests that the variability of the blood-count may be due to variation in the time since infection with the worms. In the case of ankylostoma he has shown that the greatest leucocytic reaction occurs soon after infection, and this gradually decreases although the worm may remain in the intestine.

But whilst there is much to suggest some toxic effect of intestinal worms, experiments by two French observers,[37] the details of which are not yet published, point in the opposite direction. They found that extracts of the bodies of intestinal worms were entirely innocuous, and although they admit that in the case of ascarides there is produced some volatile substance with irritating effects, they think that this plays little if any part in the production of symptoms, and that the action of intestinal worms, as an exciting cause of various symptoms, is mainly if not entirely mechanical.

REFERENCES.

[1] *Amer. Med.*, December 19, 1903.

[2] *Brit. Med. Journ*, May 14, 1904.

[3] *Brit. Journ. Childr. Dis.*, April, 1904.
   Brit. Med. Journ., February 27, 1904.
   Brit. Journ. Child. Dis. (loc. cit.).

[6] *Brit. Med. Journ.*, May 14, 1904.

[7] *Pediatrics*, December, 1903.

[8] *Archives of Pediatrics*, August, 1904, p. 561.

[9] *Archiv für Kinderheilk.*, Vol.XXXVIII.

[10] *Brit. Med. Journ.*, March 5, 1904.

[11] *Intercolon. Med. Journ.*, April 20, 1903.

[12] *Lancet*, August 13, 1904.

[13] *Amer. Journ. Med. Sc.*, September, 1903.

[14] *Archiv. Pediatr.*, December, 1902.

[15] *Pediatrics*, March, 1904.

[16] *Med. Record*, November 14, 1903.

[17] *Amer. Journ. Med. Sc.*, February, 1903.

[18] *Archives of Pediatrics*, December, 1903.

[19] *Brit. Journ. Childr. Diseases*, October, 1904.

[20] *Ibid.*

[21] *Austral. Med. Gaz.*, July 20, 1904.

[22] *Ibid.* [23] *Ibid.*

[24] *Arch. Pediatr.*, November, 1900.

[25] *New York Med. Record*, XLVI., p. 671.

[26] *Boston Med. and Surg. Journ.*, December 11, 1902, p. 632.

[27] *Med. Record*, LXII., No. 14.

[28] *Münch. med. Wochenschr.*, XXXVIII., p. 1197.

[29] *Jahrb. für Kinderheilk.*, 1901.

[30] *Amer. Journ. Med. Sc.*, CXXIII., No. 5.

[31] *Brit. Journ. Ch. Diseases*, April, 1904.

[32] *Annales de Méd. et Chirurg. Infant.*, June 1, 1904, p. 386 (ref.).

[33] *Journal de Méd.*, 1904, p. 35.

[34] *Annales de Méd. et Chirurg. Infant.*, July 15, 1904.

[35] *Deutsch. Arch. f. klin. Med.*, Bd. 77.

[36] *La Pediatria, in Arch. Pediatr.*, January, 1904.

[37] *Annales de Méd. et Chirurg. Infant.*, October 1, 1904.

REVIEW OF RECENT WORK ON DENTAL SURGERY.

ORAL SEPSIS.

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THE discussion on Oral Sepsis at the Oxford meeting of the British Medical Association emphasised strongly the importance of oral sepsis as a factor in disease. Of some diseases it appears to be the prime cause, while in others its importance as a secondary agent is such that recovery is impossible unless the mouth is attended to.

Dr. Hunter, in opening the discussion, referred to the importance and extreme prevalence of oral sepsis, to its relation, as a local infectant, to antral and nasal sinus suppurations, and to tonsillar, pharyngeal, and middle-ear disease, to a similar relation to streptococcal and staphylococcal pleurisies, empyemata, nephritis and perinephritic abscess, cholecyslitis, osteomyelitis, ulcerative endocarditis. The sepsis met with in medicine he thought due in overwhelming proportion to the mouth; or to the mouth plus the intestinal canal. He thought the positions of medicine and surgery to sepsis were now reversed—surgery almost excluded sepsis, while medicine still dealt largely with its results.

The intestinal perforations of typhoid he thought were due to a superadded and adjacent infection—probably from a septic mouth.

Dr. Hunter described the various toxic effects on the system —rashes, purpuric hæmorrhages, anæmias, headaches and mental disorders amounting to melancholia, irregular fever, and made valuable observations on septic gastritis, and "septic anæmia" and "infective hæmolytic anæmia."

Mr. K. W. Goadby read a preliminary note on the pathology of oral sepsis, accompanied by records of experiments showing in a most positive manner the virulence of the materies morbi in cases of oral sepsis. The paper gives a good idea of

the almost boundless field for pathological and bacteriological research which this subject of oral sepsis opens up. Indeed, one of the visitors remarked, "You have started a discussion you will not finish in a lifetime."

Continuing the discussion, Mr. R. G. Godlee urged the need of oral cleanliness in the mouth of the operating surgeon ; and the individual points of interest presented by each successive speaker showed how impossible it would be to thrash out the subject in one short day.

We trust further attention will be paid to this all-embracing condition, and that individual points may be brought up for separate and exhaustive consideration at a future time.

At the same meeting Prof. Arkövy (Buda-Pesth) described what he considered a new form of pyorrhœa - alveolaris — Fulminant Caries Alveolaris Specifica.

The point of special interest was the sudden development of one or more acute abscesses in connection with teeth whose pulps were living. These abscesses start along the sides of the teeth, and not at the apices.

Mr. J. G. Turner, in a paper published in the *British Medical Journal*, on the Influence of the Growth of Bone on the Positions of the Teeth, pointed out that naso-pharyngeal obstruction in youth, by interfering with the growth of the maxillæ, left the teeth arranged in a crowded arch, and more or less approaching their developmental arrangement in position.

Failure of spacing, which should occur between the front temporary teeth from the age of $4\frac{1}{2}$ years onward to the extent of about $\frac{1}{8}$th inch, was a sign of failure of bony growth, and should induce a search for the cause—oftenest adenoids.

Mr. Sidney Spokes, in the course of a paper on "The Care of Children's Mouths," urged the need of sound teeth in order to promote thorough mastication—indeed he urged *teaching* the children to masticate thoroughly, and the need for it.   He mentioned that it was possible to educate a "pharyngeal reflex," which would act so efficiently that the pharynx would refuse to swallow any but the most thoroughly masticated food.   Other speakers confirmed this, including Mr. Sim Wallace, who read a paper on Physical Degeneration in Relation to the Teeth, in the course of which he urged the need for tougher meat and

harder bread as a substitute for the tooth-brush and antiseptic mouth-washes. In the course of the sequent discussion the opinion appeared to prevail that, though tough meat and hard bread were eminently desirable, the tooth-brush and mouth-washes must hold their place, since most dentists appeared to find the uncleansed mouths of patients, of whatever class of " feeders," most unpleasant to work on.

An interesting case of what appears to be unilateral (left-sided) luxation of the mandible is recorded by R. Dunn in " Items of Interest " (July, 1904, Vol. 26, No. 7).

The luxation was of five years' standing, and had followed on a series of dental accidents and extractions inducing an abnormal bite and culminating at the age of 15 in displacement of the left condyle from its socket. At the age of 20 Mr. Dunn saw the patient, and by means of appliances, designed to restore the normal bite, succeeded in reducing the displacement.

In *L'Odontologie*, No. 19, October 15, 1904, will be found an account of a case of hemihypertrophy of the face, by L. Clerc. The case was congenital and limited to the right side. The temporary teeth of that side erupted irregularly, beginning at the age of four months with the molars, which were enlarged. Later the permanent teeth were found similarly enlarged. Microscopic sections showed the tubuli of the dentine widely separated, enlarged, and running well on into the enamel.

Miller, discussing dental erosion in the *Dental Cosmos*, Vol. 46, April, 1904, relates cases in which gold fillings were worn away at a similar rate to the actual tooth-tissue. One case he relates in which widespread and extending erosion was arrested after an attack of influenza.

Hopewell Smith in the same number describes the appearances of old-age degeneration of the alveolar-dental ligament. Finely fibrous tissue, enclosing large areolæ, is all that is found. There are no cells, blood-vessels, or nerves.

E. S. Talbot (*Dental Cosmos*, Vol. 46, No. 11, November, 1904), in a paper on the anatomic changes in the head, face, jaws, and teeth, in the evolution of man, notes that there has been considerable lateral reduction in size as measured from the outside surface of the one first molar to that of the other. He notes a reduction from 2·50 inches, which is the average

arrived at by Mummery in ancient British and Roman skulls to 2·19 in modern American.

Prof. Cryer (*Dental Cosmos,* September, 1904), discussing typical and atypical occlusion of the teeth, expresses the opinion that in growth the cancellated parts of the jaws move forwards, carrying the teeth with them, the upper more than the lower; while the hard cortical part enlarges interstitially.

Mr. J. G. Turner (*supra cit.*) finds that the lower second bicuspid moves backwards when deprived of the support of the first molar behind it in early life.

In the *Dental Cosmos* for June, 1904, is recorded a case of lingua nigra, from which an identical fungus was obtained both from the tongue and gums.

In the *Dental Record* of May, 1904, is recorded a death under ethyl chloride during a dental operation; and in the *British Medical Journal* of April, 1904, a case of Tooth in the Trachea, showing how easily a tooth may lodge during anæsthetic, giving rise to no symptoms, even on recovery and from anæsthesia, till after weeks or months an abscess forms.

BY-PATHS OF MEDICINE.

FRENCH DOCTORS BEFORE MOLIÈRE.

ONE of the intellectual bye-products of the rapid advance of science in the second half of the nineteenth century was a foolish contempt of the work of previous labourers in the vineyard of truth. This was especially marked in the case of medicine. It was a result of the over-stimulating action of the new wine of knowledge on " poor and unhappy brains " not strengthened by liberal culture. The greater interest in the history of the healing art shown at the present day coincides with the rise in the standard of general education in the medical profession, which is partly at least attributable to the larger share now taken by the older universities in the training of practitioners. There is a more general appreciation of the fact that there is an evolution of ideas as there is of life, and that existing forms of thought cannot be thoroughly understood unless the history of their development is known. Hence it is coming to be recognised that the study of medical history is not a matter of mere antiquarian interest but a part of the scientific equipment of every practitioner whose mental outlook is not limited by the counter of a " doctor's shop." The study is indeed beset with not a few difficulties. The conceptions of the old physicians are so strange to the modern mind, their theories are often so fantastic and their language so obscure, that it is always hard and not seldom impossible to grasp their meaning. It is easy to laugh at their absurdities, but it is more profitable to seek to discover their point of view, how they looked at facts, and how they went astray in their reasoning. In the Fitz-Patrick Lectures on English Medicine in the Anglo-Saxon Times, recently published by the Clarendon Press, Dr. Payne says well that the only way to understand the old writers is to put ourselves as far as possible in their places, and conceive how nature and science presented themselves to their eyes.

For nearly five hundred years before the coming of Christ, and for seventeen centuries after it, Greek thought held sway

in the realm of medicine. ıHippocrates and Galen were venerated not as pioneers but as masters whose teaching was final and unquestionable. These great men had themselves studied nature with the clear insight and objectivity of the Greek intellect. But their teaching became fixed into a rigid system of law, and their authority held the human mind in thrall to such a degree that men could see things only through their eyes. The study of their books took the place of observation, and nature herself was held to be subject to their authority.

Readers of "Tristram Shandy" will remember how in the famous dispute about noses, the doctors one side assert that in certain circumstances a man must die of a plethora, or must spit blood and in a fortnight or three weeks go off in a consumption. The argument proceeds as follows:—It happens otherwise—replied the opponents. *It ought not,* said they.

This exactly indicates the attitude of the mediæval physicians to mere facts. As the philosopher Malebranche saw everything in God, they saw everything in Hippocrates and Galen.

An interesting and lucid account of mediæval medicine is given by Dr. Edward Minvielle in *La Médecine au Temps d'Henri IV.* (Paris 1904). He deals more especially with medicine in France, but at the end of the fifteenth and beginning of the sixteenth centuries French medicine may be taken as representing the knowledge of the time.

Hippocrates knew nothing of anatomy, and Galen's notions of structure were drawn from dissections of animals. In the fourteenth century Mondino, greatly daring, dissected the bodies of two women, but did not open the head fearing lest he should thereby be guilty of a mortal sin. In 1396 Charles VI. gave the University of Montpellier leave to dissect once a year the body of some one condemned to death, "whatever might be the sex or religion of the person or the nature of the execution." It was not till 1478 that the first dissection was performed in Paris. In 1556 an anatomical theatre was built at Montpellier under the direction of Guillaume Rondelet, who, by way of inaugural ceremony, publicly dissected there the body of his own child. It was not till 1604, in the reign of Henry the Fourth, that a similar theatre was built in Paris. How small

a place anatomy occupied in the scheme of medical study for many years afterwards is shown by an ordinance, bearing date February 1660, that at least *two* "anatomies" must be performed in the schools every year.

Pathology was a compound of Galen's "temperaments" and "humours" with astrology and the mystical properties of numbers. There were certain critical periods in the life of man when special watchfulness was needed to escape the dangers that threatened health. The number 7 and its multiples was credited with a sinister influence in the production of these crises. The reasons assigned for this belief were that the world was created in seven days ; that Adam and Eve remained seven hours in Paradise ; that the animals went by sevens into the ark ; that the seventh hour decides whether an infant is to live or die ; that the teeth begin to appear at the age of seven months, and the child begins to speak at twenty-one months ; that the milk teeth fall out at the age of seven, while puberty begins at fourteen, and man's estate is reached at twenty-one ; that growth stops at thirty-five, the strength is fully developed at forty-two, and forty-nine is the prime of life ; lastly, that sixty-three is the usual limit of human existence.

Certain days played a prominent part in the medical practice of Hippocrates, and the notion of good and bad days for bleeding ruled the minds of leeches and laymen through the Middle Ages.

With such a multitude of factors to be taken into account each case with which the mediæval physician had to deal was necessarily a most complicated problem. But he had an unfailing resource in any difficulty of diagnosis. Arnold of Villanova, who flourished in the fourteenth century, instructed his pupils never in any circumstances to show hesitation or surprise. "Supposing," he says, "that you can make nothing of your patient's case : tell him confidently that he has obstruction of the liver. Should he reply that it is his head or any other part that ails him, say boldly that the pain comes from the liver. Be careful to use the term "obstruction" because sick folk do not know what it means, and it is important that they should not." Fortunately for many puzzled practitioners people at the present day know just as little what it means as they did in the middle ages, and

"obstruction of the liver" still does duty as an explanation of obscure symptoms.

Treatment was mainly directed to the expulsion of peccant humours from the sick body. With this object patients were drenched with drastic purgatives ; the enema syringe was the sign in which physic conquered disease, and the lancet, like Macbeth's dagger, marshalled practitioners the way to thera-peutic glory—or to murder. The art of purging was one of the greatest nicety. The rules of art required that the medicine should be exactly adapted to the temperament of the patient. Besides this, as each purgative drug was supposed to have an elective action on the several humours, great care was required in choosing the right one. There were purges with a special action on every part of the body : some acted by *attraction*, drawing to themselves the perilous stuff to be got rid of ; while others worked by *impulsion*, driving before them the humour to be expelled. Already in the reign of Henry IV. the clyster was in high favour, though it was not used on the heroic scale that became fashionable later. Henry himself employed it in moderation, but we know from the famous journal of the King's health kept by Louis XIV.'s physicians that the Sun-King had many thousands of clysters administered to his august person. The practice of wholesale bleeding was introduced in the 15th century by Leonardo Botalli, who was physician to Charles IX. and Henry III. If a man was ill he was bled to let out the evil humours ; if he was well, to prevent their formation. It was an accepted dogma of the medicine of the day that the human body contained 24 pounds of blood, of which 20 could be withdrawn without causing death. Botalli being asked whether the removal of so much blood did not weaken people, replied that the more stagnant water was withdrawn from a well the more fresh pure water came up ; the more a nurse suckled a child the more milk she had. Even so, he held, was it in regard to the blood. Strong young men were bled every month, old people from four to six times a year.

Laurent Joubert, who was physician to Henry III., justified the practice as follows :—When a man is bled, if bad blood is seen to issue, it must be inferred that the good blood remains in the body, and rejoices at the clearance. Some might believe

that this method of treatment is contrary to the duty of nature, which is careful to preserve the blood as a treasure belonging to her. To such we make answer that it is nature herself who has taught us to make use of this remedy in many diseases ; for the menstrual flux in women shows clearly that an abundance of blood may be harmful if it be not forthwith removed." Ambrose Paré bled a man of 28 twenty-seven times in four days, and relates the fact " to encourage the young surgeon not to be timid in drawing blood in cases of acute inflammation." In 1590 A. de Corbye, a surgeon, writes : —

" Now we bleed children of three years and under, we even repeat the operation with good effect ; and men of 80 bear it very well." In 1609 a physician named Le Moyne confesses that in the space of fifteen months he had taken 25 lbs. of blood from a young girl. Later, blood-letting became a veritable craze. Louis XIII. was bled forty-seven times in one year by his physician Bouvard, and in the reign of Louis XIV., that " sanguinary pedant" Gui Patin, boasts in his correspondence of his exploits with the lancet. He calls bleeding " one of the principal mysteries of our art." He showed the strength of his faith in the mystery by ordering his wife to be bled twelve times in the course of a pneumonia, and his son twenty times during a continued fever. His fanatical belief in blood-letting led him to spare neither age nor sex. He writes : —

" We cure our patients over 24 by bleeding, and we also most happily bleed infants of two or three months, without any ill effect. I could show more than two hundred persons alive in Paris who have been bled at that tender age."

He bled an infant three days old, and a child of 7 years thirteen times in a fortnight. Riolan said that only the doctors of Paris knew to what an extent the practice ought to be pushed. A measure of their devotion to their principles is afforded by the enthusiasm with which they used the remedy on themselves. Patin had himself bled seven times for a common cold, and he relates like things of other physicians. Thus Mautet was bled thirty-two times in the course of a fever, and Cousinot sixty-four times in an attack of rheumatism. Baralis, at the age of 80, was bled eleven times in six days. Patin had no patience with those who did not believe in his

panacea, or used it moderately. He records with indignation that a physician, Guy de Labrosse, died without having been bled. Venesection had been suggested, but the dying man preferred to die unbled. For this Patin treats him as a blasphemer, and worse. "The Devil," he says, "will bleed him in the other world as he deserves to be, the scoundrel, the atheist!"

The old pedant evidently looked upon a doctor capable of allowing himself to die without the last consolations of medicine as justly doomed to eternal punishment.

Of the Materia Medica of the Middle Ages little need be said here; the subject was exhaustively treated in THE PRACTITIONER of April, 1901, p. 421. An extract from the *Pharmacopée* of Jean de Renon, physician to Henry IV., which was published in 1608, will suffice to give an idea of the contents of a druggist's shop at that period :—

"Many entire animals are used, such as Spanish flies, wood lice, worms, lizards, ants, vipers, scorpions, frogs, lobsters, leeches, and several small birds. As for the parts of them, our doctors hold surely and in good sooth that they are endowed with many and wonderful virtues. Among which parts we may place the skull or the head of a man dead but not buried; the bone that is in the heart of a stag; the brains of sparrows and hares; the teeth of the boar and the elephant; the frog's heart; the fox's lung; the goat's liver; the wolf's guts; the testicles of the beaver and the cock; the bladder of the hog; the penis of the stag, and the skin and slough of the serpent.

"Item, fat of man, hog, goose, sheep, duck, rabbit, she goat, eel, and serpent; the spinal marrow of the stag, the calf and the goat; human blood, and that of the pigeon and the goat; every kind of milk, and all that comes therefrom, as butter and cheese; the horns of the stag, the roebuck and the unicorn; the hoof of the elk, the she goat and the buffalo; the shell of the oyster and the pearls with it, and the shells of various fishes. Lastly, since the excrements of the said animals have also their special virtues, it is not unseemly that the pharmacists should keep them in his shop—especially the dung of the she-goat, the dog, the swan, the peacock, the pigeon, the musk cat, the civet, and the hairs of certain animals."

The human body furnished several medicinal substances,

and mummy in particular was in such request that when the supply ran short, enterprising dealers opened the coffins of poor folk who had died of leprosy or plague and took out the "cadaveric corruption" which they sold as real and authentic mummy. Human fat was in great repute as a cure for rheumatism, and its sale was one of the perquisites of the public executioner. Even at the present day we believe there are parts of France where dissecting-room attendants do a brisk trade in the same article.

With these therapeutic resources at their disposal medical men prospered exceedingly in the days of Henry IV. One reason of this was that there was no overcrowding. It has been estimated that in 1596 the population of Paris was 350,000. A list of the members of the Faculty of Medicine drawn up by the Dean in 1598 shows that at that time the total number of physicians was 96, giving a proportion of one to every 3,600 inhabitants. At the present time the proportion is one practitioner to 1,600 inhabitants.

FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

ST. BARTHOLOMEW'S HOSPITAL AND SCHOOL.

GREAT MEN.

[With Plates XX.—XXIII.]

ST. BARTHOLOMEW'S HOSPITAL has attracted to itself a large number of remarkable men in the course of its long and beneficent career. Everyone interested in the hospital knows the names of Rahere, Vicary, Harvey, Pott, Lawrence, Paget, and Savory, but only a few know more than their names. It is the object therefore of the following pages to give a short account of those who have made the hospital famous.

RAHERE.

The loving care of a canon of the Priory of St. Bartholomew has preserved for us some facts about Rahere, our founder, facts obtained from "those who saw him, heard him, and were present in his works and deeds, of the which some have taken their sleep in Christ and some of them be yet alive and witnesseth of that what we shall after say," for he wrote about 1180, and Rahere died in 1144. Rahere (Fig. 18) was of Norman ancestry, perhaps from the east side of Brittany, and he was born about 1080 of low lineage. "When he attained the flower of his youth he began to haunt the households of noble men and the palaces of princes, where under every elbow of them he spread their cushions with japes and flatteries, delectably anointing their ears. . . . And even he was not content with this, but often haunted the king's palace. This wise to king and great men, gentils and courtiers familiarly and fellowly was he known." Yet, though he was a courtier in the following of William Rufus, he was also an ecclesiastic, and had for his patrons Richard de Balmeis, made Bishop of London in 1105, and Richard's nephew, who became Dean of St. Paul's in 1111. About 1115 Rahere was appointed to the prebendal stall of Chamberleynes wood in St. Paul's Cathedral, and about 1120

went to Rome on a pilgrimage. He bewailed his sins at the Tre Fontane, the place of martyrdom of St. Paul, and there "he avowed if health God him would grant that he might lawfully return to his country he would make an hospital in recreation of poor men and to them so there y-gathered, necessaries minister after his power." On his return to London and in accordance with a vision, which has already been told (p. 111), he began to build the hospital of St. Bartholomew in March, 1123, and soon afterwards a priory of Augustinian canons, of which the church still remains to us as the parish church of St. Bartholomew the Great.

Rahere was appointed the first master of the hospital, and to the Austin canons "was prelate xxii years, using the office and dignity of a prior, not having cunning of liberal science, but that that is more eminent than all cunning, for he was rich in purity of conscience." He resigned the mastership of the hospital in 1137, being succeeded by Hagno, and in his later years he associated with himself Alfune, the builder of St. Giles' Cripplegate, who helped him greatly in collecting food and alms for his brethren the canons and also for the poor men that lay in the hospital, as is shown in the following story from the *Liber Fundacionis* " of Gooderich the butcher, a man of great sharpness . . . which to the asker would not give, but was wont with scorning words to insult them. It fell upon a day that while this foresaid Alfunyne went about the butchers man by man and after others when he came to this Godryke and moved him with good and honest words of opportunely and importunely because he was not willing to give, he persevered that he would not go from him void, and when the old man beheld that he would not for dread, neither for love of God nor also for shame of men he might not temper the hardness of that obdurate heart he broke out in these words 'O, thou unhappy, O, thou ungentle and unkind man to the giver of all good, that for the gift of heavenly goodness will not commune with the poor men of Christ, I beseech thee, wretch, put away a little and assuage the hardness of that unfaithful soul and take in experience the virtue of the glorious apostle, in whom if thou trust, I promise thee that every piece of thy meat that thou givest me a portion of shall sooner be sold than the rest and nothing

in the minishing or lessening of the price.' He was moved not with the instinct or stirring of charity but overcome with the importunity of the asker, he drew out a piece of the vilest meat and cast it into Alfunyn's vessell, calling them truants and bade them lightly go from him : to whom Alfunyn answered ' I shall not go from thee till my word and promise be fulfilled.' And without delay there was a citizen coveting to buy flesh for himself and his household and of that heap of the which Alfunyn spoke before, he bought at the will of the seller and took it away with him. And when this was told
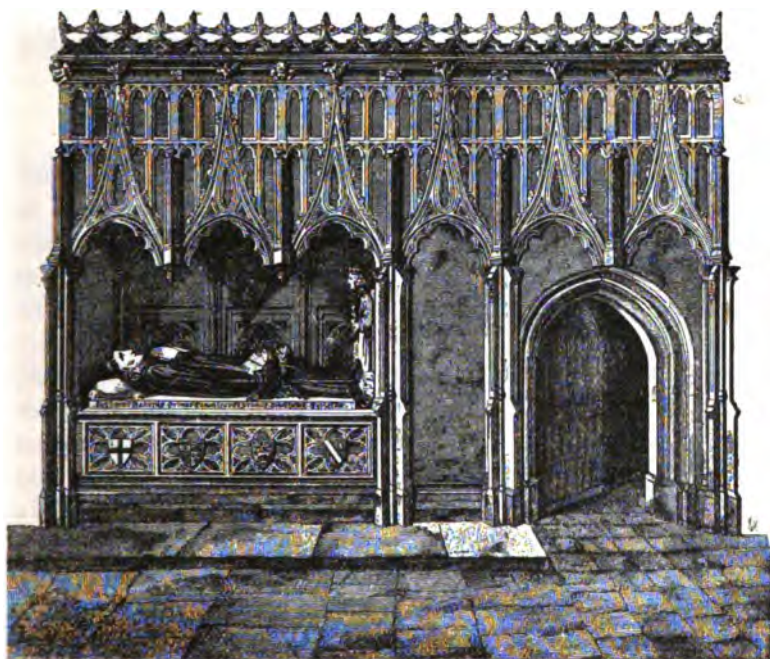

Fig. 18. *Tomb of Rahere.*

through all the butchery, it was taken for a worthy miracle as was fitting. And from that time they began to be more prompt to give their alms and also fervent in devotion."

Rahere died September 20, 1144, and was buried on the north side of the altar of the Priory Church in the place where his tomb still stands with the inscription " Hic jacet Raherus, primus Cononicus et primus Prior hujus ecclesiæ." The alabaster (Fig. 18) effigy represents Rahere with a shaven crown in

the black robe of an Augustinian canon ; a crowned angel at his feet holds a shield " gules bearing two lions passant guardant with two crowns or in chief." At each side of him is a small kneeling figure of a monk reading from a book open at the passage " For the Lord shall comfort Zion : He will comfort all her waste places, and he will make her wilderness like Eden and her desert like the garden of the Lord. Joy and gladness shall be found therein, thanksgiving and the voice of melody." The effigy is probably of Rahere's century, it has well-marked features and is almost certainly a portrait. A vaulted canopy is above the tomb with tabernacle work of the fifteenth century, whilst beneath it are panels belonging, like the canopy, to the perpendicular style.

THOMAS VICARY.

Thomas Vicary (Fig. 19) was one of the most prominent men about St. Bartholomew's Hospital for many years after its second foundation. Born in all probability between the years 1490 and 1500, he was a man of Kent, and practised for a time as a surgeon at Maidstone. He came to London, and in 1530 he was one of the surgeons to King Henry VIII. and was Master of the Barbers Company. About 1535 he was appointed serjeant-surgeon to the King, and this office he held under Edward VI., Mary, and Elizabeth. In 1541 he was appointed the first Master of the United Company of Barbers and Surgeons, a position he occupied no less than five times. He died late in 1561 or at the beginning of 1562, having been twice married but leaving no children. We know him best by the carefully drawn portrait (Fig. 19) in Holbein's great picture, where he is represented as receiving a charter from Henry VIII.

At St. Bartholomew's Hospital Vicary seems to have acted as medical superintendent, though it is doubtful whether he ever practised as a surgeon to the hospital. He was appointed one of the six new Governors of the hospital on September 29, 1548, and on January 16, 1551–2, " It is ordered that Thomas Vicary shall be one of the assistants of this house for the term of his life." On October 2, 1554, " This day it is ordered that Mr. Vicary should have the oversight of all such officers as be within the hospital in the absence of the

Governors and to reform such things as hee seeth amiss in any officer and to make report to the Governors at their next meeting." He had three surgeons under him, each of whom received £18, and at a later time £20 per annum. He was clearly resident, because in 1550 his house was repaired by the hospital, and in June, 1651, he was given the old Convent Garden. He had, too, a livery of much more costly material than that supplied to any other officer. Thus in the discharge account of 1552–3 there is an entry for :—

> " Three yards of fine new collour for Mr. Vicar's lyverye
>   at xii a yarde . . . . xlviii."

and in the following year—

> " For Mr. Vicaryes liverye . . . . liiis."

After his death the surgeons at St. Bartholomew's Hospital published in Vicary's name a treatise of anatomy to which they gave the title of *The Englishman's Treasure.* It was said to have been compiled by " that excellent Chyrurgion Mr. Thomas Vicary, Esquire." It ran through at least seven editions, and until lately was thought to be a compilation by Vicary ; but Dr. Payne has shown good grounds for thinking that it is merely a transcript of a fourteenth-century work on anatomy which may or may not have been made by Vicary.

DR. WILLIAM HARVEY.

William Harvey (Fig. 20), the discoverer of the circulation of the blood, is the glory of the latter house, as Rahere was of the first foundation. Born in 1578, the eldest son of an alderman of Folkestone, Harvey was educated at the King's School, Canterbury, and at Caius College, Cambridge. In 1600 he was at Padua, where he became the pupil and friend of Fabricius, lecturer on Anatomy, who was then perfecting his knowledge of the valves of the veins. In 1602 Harvey returned to England and settled in London, where he married the daughter of Dr. Lancelot Browne, physician to Queen Elizabeth and James I., as well as to the Royal Hospital of St. Bartholomew. He was elected a Fellow of the College of Physicians in 1607, and in the following year brought letters from the King to the Governors of St. Bartholomew's Hospital asking that he should be granted the reversion of the place

of Dr. Wilkenson, physician to the hospital, for this was the
way in which the staff was then appointed. Dr. Wilkenson
soon died, and Harvey was chosen to fill his place on Sunday,
October 14, 1609.

Dr. Moore tells us that as physician it would be his duty to
attend the hospital once a week. He sat at a table in the hall
and the patients brought to him sat on a settle by his side.
The apothecary, the steward, and the matron stood by whilst
he wrote the prescriptions in a book, which was at all other
times kept locked. The surgeons discharged their duties in
the wards, which the physician only entered to visit patients
who were unable to walk. Harvey continued to live in Ludgate
after his election and never occupied the physician's official
house (p. 116) within the hospital gates ; indeed in 1626 his
annual stipend was increased from £25 to £33 6s. 8d. because
he decided not to take up the lease of the house, which could
thus be let at a profit to someone else.

Whilst Harvey was physician to the hospital he was
appointed Lumleian lecturer at the College of Physicians, and
in April, 1616, gave his lectures to prove anatomically that
the blood passes from one side of the heart to the other by
way of the arteries and veins. At this time he was 37 years
of age ; a man of the lowest stature, round-faced, with a
complexion like the wainscot ; his eyes small, round, very
black and full of spirit ; his hair as black as a raven and
curling ; rapid in his utterance, choleric, given to gesture,
and used when in discourse with anyone to play unconsciously
with the handle of the small dagger he wore by his side.
In 1618 he was appointed to the sinecure office of physician
to King James I., and in 1631 he was appointed physician
to Charles I., to whom he soon became warmly attached and to
follow whose cause he ultimately severed his connection with
the hospital, although he remained physician until 1653, when
he was succeeded by (Sir) John Micklethwaite. When the
King was at Oxford, Harvey held the post of Warden of
Merton College in the year 1645-6, at a time when he was
busy with his experiments on the development of animals.
Harvey retired from public life after the execution of
Charles I., and being well advanced in years and exceedingly
troubled with gout, spent much of his time with one or other

PLATE XX.

Fig. 19.

Fig. 20.

PLATE XXI.

Fig. 21.

Fig. 22

of his brothers, successful Turkey merchants. He died at Roehampton, in the house of Sir Eliab Harvey, on June 3, 1657, and is buried at Hempstead, near Saffron Walden, in Essex. Although Harvey fortunately never attained to a large or fashionable practice, he was able to serve the hospital materially, for he came of a family of first-rate business capacity. The minutes of the Hospital Court contain numerous entries about him whilst he was physician, and show that the governors had a high opinion of his capacity. Indeed, Sir James Paget says that during the 34 years he held the office of physician he was more honoured by the governors and exercised a greater influence in the affairs of the hospital than any medical officer before the time of Abernethy.

WILLIAM CLOWES.

Surgery reached its lowest ebb in the later years of the reign of King Henry VIII. It became of no account as a profession, and an Act of Parliament was passed to allow any quack to practise. But even at this dark time there existed a band of men to whom surgeons must always be grateful, for they made a serious attempt to advance the best interests of the profession in face of the greatest difficulties. Some of these men lived in the provinces, others resided in London. At first they worked independently of each other; afterwards, recognising each other's worth and that they had a common end in view, they became friends and toiled together. The best known members of the band were Thomas Gale, William Clowes, John Halle, John Read, and John Banester. Gale and Clowes were well known as surgeons in London, Halle practised in Kent, Read in Gloucester, and John Banester at Nottingham.

William Clowes was born in 1540, a Warwickshire man, and was apprenticed to George Keble. In 1563 he was a surgeon in the army commanded by Ambrose, Earl of Warwick, and after the Havre Expedition he served for several years in the navy, as was not unusual at a time when the two Services were not separated, and the same leader was sometimes a general and sometimes an admiral. In 1575 he was elected a Surgeon to St. Bartholomew's Hospital, becoming full Surgeon in 1581. He was also Surgeon to the Bluecoat

School. He went to the Low Countries with the Earl of Leicester in May, 1585 ; and on his return to London he was admitted a Member of the Court of Assistants of the United Company of Barber Surgeons, becoming a Warden of the Company in 1594, though he was never elected Master. He served in the English fleet against the Spanish Armada, and was afterwards appointed Surgeon to Queen Elizabeth. He died at Plaistow, in Essex, in 1604.

Clowes writes strongly about the multitude of quacks, and he had quite a remarkable flow of language when he was properly roused by their enormities, as will be seen from the following passages :—

" Where the learned physician or surgeon cannot be had for counsel, I am herein to admonish the friendly reader to take heed and not to commit themselves into the hands of every blind buzzard that will take upon them to let blood, yea, to the utter undoing of a number. For many in these days being no better than runagates or vagabonds, do extraordinarily, yea, disorderly and unadvisedly intrude themselves into other men's professions, that is to say, not only in letting of blood, but also do take upon them further to intermeddle and practice in this art, wherein they were never trained nor had any experience : of the which a great number be shameless in countenance, lewd in disposition, brutish in judgment and understanding as was their unlearned leader and master Thessalus, a vain practitioner, who when his cunning failed, straightways sent his patients to Lybia for change of air. . . . This their grand captain was by profession a teazler of wool and also the forerunner of this beastly brood following : which do forsake their honest trades, whereunto God hath called them, and do daily rush into physic and surgery. And some of them be Painters, some Glaziers, some Tailors, some Weavers, some Joiners, some Cutlers, some Cooks, some Bakers, and some Chandlers. Yea, now a days it is apparent to see how Tinkers, Tooth - drawers, Pedlers, Ostlers, Carters, Porters, Horse-gelders, and horse-leeches, Idiots, Apple-squires, broom- men, Bawds, witches, conjurers, Sooth-sayers and sow-gelders, Rogues, rat-catchers, runagates and proctors of Spittle-houses with such other like rotten and stinking weeds which do in town and country without order, honesty or skill daily abuse

both physic and surgery, having no more perseverance, reason
or knowledge in this art than hath a goose, but a certain blind
practice without wisdom or judgment, and most commonly
useth one remedy for all diseases and one way of curing to
all persons both old and young, men, women and children,
which is as possible to be performed or to be true as for a
shoemaker with one last to make a shoe to fit for every man's
foot and this is one principal cause that so many perish."
The picture, though deplorable, does not seem to be greatly
exaggerated, as it is confirmed by Gale, who says, in almost
identical words, that a similar state of things existed in the
army in his time, and by Halle, who met with the same
hindrances in the provinces.

Clowes' outspoken expressions of opinion did not render
him a *persona grata* to his contemporaries and sometimes led
him into trouble. Thus it is recorded in the books of the
Barber-Surgeons' Company, that on ' 28th February, 1576.
Here was a complaint against William Clowes by one
Goodinge for that the said Clowes had not only misused the
said Goodinge in speech but also most of the Masters of the
Company with scoffing words and jests and they all forgave
him here openly in the Court and so the strife was ended upon
condition that he should never so misbehave himself again,
and bonds were caused to be made to that effect. But, alas,
for the frailty of human nature ! in the very next year on
' 25th March, 1577. Here at this Court was a great contention
and strife spoken of and ended between George Baker and
William Clowes for that they both contrary to order and the
good and wholesome rules of this house misused each other
and fought in the fields together. But the Master, Wardens
and Assistance wishing that they might be and continue loving
brothers pardoned this great offence in hope of amendment.'
Clowes' opponent on this occasion was one of the Earl of
Oxford's men, who afterwards became Serjeant-surgeon to
Queen Elizabeth and was master of the company in 1597.

It is not surprising, I think, that people objected to Master
Clowes' expressions and endeavoured to misuse him, for he
sums up his opinion of one of his fellows with the words he
was a " great bugbear, a stinging gnat, a venomous wasp, and
a counterfeit crocodile."

JOHN WOODALL.

The tradition of surgery lingered for some time in London in the possession of the United Company of Barber-Surgeons, and John Woodall (Fig. 21) was its chief repository. We know but little of his life. He was born about 1569, and at the age of 20 he served in Lord Willoughby's expedition to render assistance to Henry IV. of France. He then travelled for many years through France, Germany and Poland, gaining his livelihood by the practice of his profession, until his familiarity with the plague tempted him to settle in London during the great plague year of 1603. Shortly afterwards he was appointed by Sir Thomas Smith to the post of Surgeon-General to the East India Company. He became surgeon to St. Bartholomew's Hospital 9th January 1616, and was the youngest warden of the Barber-Surgeons' Company in 1625, though he was not elected second warden until 1627, nor master until 1633. He was appointed in 1627 "to go to Portsmouth to cure the wounded soldiers that come from the Isle of Rea in France." In 1641 he was an examiner in Surgery at the United Barber-Surgeons' Company, and in 1639 he complains that time has overtaken him "so that now I am forced to conclude having run through the cares of sixty-nine years : old age being an enemy to study, for my sight being weakened, my memory much impaired, and my capacity utterly unable to perform so hard a task" as the continuation of his surgical treatises. He died in October, or in the early part of November, 1643.

If Woodall had done nothing else he would deserve the lasting gratitude of every sailor, for he inferred the efficacy of limejuice from the happy accident of two ships' crews, one smitten with scurvy, the other free from it, differing in this one article of diet and nothing else. In the eyes of his contemporaries Woodall did much more. He published in 1617 the *Surgion's Mate,* and in 1628 *The Viaticum : being the pathway to the Surgion's Chest,* text-books of surgery which long formed part of the library of every surgeon and surgeon's mate or assistant by sea as well as by land. To us Woodall stands out as the one surgeon in the reign of James I. who carried on his craft as a profession and not as a trade. The art of

surgery had fallen to so low an ebb that he is almost literally
correct when he says in his preface to the *Viaticum* that " for
this forty years last past no Surgion of our Nation hath pub-
lished any book of the true practice of surgery, to benefit the
younger sort, these my mean Treatises only excepted."

It had been the duty of the earlier Elizabethan surgeons to
struggle against the usurpation of surgery by quacks. Woodall
fought to secure the freedom of the surgeons against the
physicians. It had been long laid down that a surgeon ought
not to give inward medicines without the counsel of a physician,
but the attempt to obtain a free hand for the surgeons was
quite futile. The physicians at this time and for many years
afterwards were too strong, and in June, 1632, they obtained an
order of council with a clause to the effect that no chirurgeon
" doe dismember, Trepan the head, open the chest or belly, cut
for the stone, or do any great operation with his hand upon
the body of any person to which they are usually tied to call
their Wardens and Assistants but in the presence of a learned
physician, one or more of the College or of his Majesty's
physicians."

The physicians afterwards exhibited a bill in the Star
Chamber to strengthen their powers still further, but the sur-
geons petitioned against it successfully, and in 1635 Charles I.
ordered it to be expunged. The desire however remained,
and for many years the physician struggled hard to keep the
surgeons in an inferior position. It was useless for Woodall to
write :—

" Galen in his third and fourth books, *De Methodo Medendi*,
doth name the artist Medicus that doth cure ulcers and
wounds, &c., and many ancient writers call him Medicus
Chirurgus ; whereby it appeareth, that the surgeon is Medicus
a Medendo, and retains the name Chirurgus by performing the
art of healing in a practick way, namely by the hand, and,
therefore, is rightly called Medicus Chirurgus, and thereby is
capable to use all medicines for healing. And if so, he must
not of necessity be forbidden lawful practice ; otherwise how
shall he well perform his scope of healing, when he is either in
ship, in camp, or anywhere in the country, where physicians
are either not at hand, or will not come ? as when and where
contagious diseases happen, namely the small and great pox

and the pestilence, &c. Now here in all conscience the surgeon must be admitted to show his utmost skill for healing men's infirmities without danger of any law, if he be a man lawfully called, as aforesaid to the exercise thereof: otherwise it were very unreasonable that the surgeon alone should be pressed to the healing of his Majesty's subjects, where no physician or apothecary is admitted to advise, assist or direc him, and yet to practise should be held unlawful to him when he performeth his best in any action or part of healing to his patient's good. But, God be thanked, there are both ancient and modern good laws, orders and ordinances, which do manifestly enable a surgeon to exercise his science, and to breed up servants to be expert therein, for the better continuance of the art, and for the future increase of good and able surgeons for the service of his Majesty and the commonwealth. And to manifest the same his Highness not only alloweth the use of inward and physical drugs and medicines to the surgeons for his own service but is further graciously pleased (out of his own coffers) to pay for them."

DOUGLAS.

Dr. Norman Moore tells that Mr. Douglas was a physician in London who constantly attended the hospital though he was not a member of the staff. In 1716 he described very clearly, in a paper published in the *Philosophical Transactions*, the general appearances of amyloid disease of the spleen in a case of marasmus with strumous enlargement of the lymphatics. He also says that while he was going round the wards of the hospital he saw a young man suffering from palpitation, and that as his heart beat he could hear a distinct sound with the beating of the heart. The man died, and Douglas describes how at the post-mortem he saw the heart was enormously enlarged, and the aortic valves were contracted and hard so as to allow the blood to flow back into the ventricle. He had thus discovered the murmur caused by aortic disease a hundred years before the stethoscope came to make such an observation easy.

CHARLES BERNARD.

Charles Bernard may be looked upon as one of the first English surgeons who ranked as a well-educated gentleman

He was thus the forerunner of such men as Cæsar Hawkins, Percivall Pott, Anthony Carlisle, and James Paget, who, by their lives; raised the status of a surgeon to its present high position. ;·Bernard possessed a large and valuable library, the sale of which was attended by Swift though he bought nothing. Bernard was born in 1650 and died in 1711. He was elected surgeon to St. Bartholomew's Hospital on August 26, 1686, upon the special command of King James II., and he became serjeant surgeon to Queen Anne soon after her accession. Bernard had the chief surgical practice of his day, and Dr. Moore says that he was famous for his skill in operating and his desire never to operate unnecessarily.

PERCIVALL POTT.

The name of Percivall Pott (Fig. 22) is known throughout the surgical world on account of the careful description he gave of a fracture which he' sustained in his own person. " As he was riding in Kent Street, Southwark, he ·was thrown from his horse and suffered a compound fracture of the leg, the bone being forced through the·integuments. Conscious of the dangers attendant on fractures of this nature and thoroughly aware how much they may be increased by rough treatment or improper position, he would not suffer himself to be removed until he had made the necessary dispositions. He sent to Westminster, then the nearest place, for two chairmen to bring their poles, and patiently lay on the cold pavement, it being the middle of January (1756) till they arrived. From this situation he purchased a door, to which he made them nail their poles. When all was ready he caused himself to be laid on it, and carried through Southwark, over London Bridge to Watling Street, near St. Paul's, where he had lived for some time. . . . . . At a consultation of surgeons the case was thought so desperate as to require immediate amputation. Mr. Pott, convinced that no one could be a proper judge in his own case, submitted to their opinion, and the proper instruments were actually got ready, when Mr. Nourse (his former master and then colleague as surgeon at St. Bartholomew's Hospital), who had been prevented from coming sooner, fortunately entered the room. After examining the limb he

conceived there was a possibility of preserving it : an attempt
to save it was acquiesced in and succeeded."

Pott was born at the beginning of the year 1713, the son
of a scrivener, who died in 1717, leaving his wife nearly penni-
less. Pott was educated by the help of a distant relation
—Dr. Wilcox, Bishop of Rochester—and was apprenticed to
Edward Nourse, then an assistant surgeon at St. Bartholomew's
Hospital. He was admitted to the freedom of the United
Company of Barbers and Surgeons in 1736, not in the ordinary
way, but after a more searching examination, which gave him
the " Great Diploma " and showed that he intended to practise
exclusively as a surgeon. On March 14, 1744, Pott became
assistant surgeon to St. Bartholomew's Hospital " in room
of Joseph Webb, appointed surgeon and guide (p. 123) to
Kingsland Hospital," and on November 30, 1749, he was made
full surgeon to the Charity. This post he resigned on July 12,
1787, having served the hospital, as he used to say, man and
boy for half a century. He died December 22, 1788.

Pott was not only a great teacher of surgery but he introduced
a wholesome scepticism into the profession, for with a full
knowledge of what his predecessors had done and thought
before him, he thought and observed for himself, drew his
own conclusions, and acted upon them. He may be regarded
therefore as the earliest surgeon of the modern type. He
cannot be compared with any of his contemporaries, but his
chief predecessor was Richard Wiseman, and his greater
successor was his own pupil John Hunter. Pott was as far
in advance of Wiseman as that surgeon had been in advance
of Gale, of Clowes, or of Woodall. Like Wiseman, Pott was
of necessity a practical rather than a scientific surgeon, for
pathology as yet had no existence. Like Hunter, Pott was
a great teacher though a diffident lecturer : as a practical
surgeon Pott ranks far before his pupil Hunter, but as a
scientific surgeon the pupil was much greater than his master.
In his writings Pott was more fortunate than Hunter in the
fact that the clearness of his style enabled him to place his
facts and speculations in the most attractive form ; whilst
Hunter was constantly struggling to make his feeble powers
of expression carry the greatness of his ideas, for he was no
master of words.

DR. WILLIAM PITCAIRN.

Dr. William Pitcairn (Fig. 23) was born in 1711, the eldest son of Rev. David Pitcairn, minister of Dysart, in Fife. He studied under Boerhaave, at Leyden, and graduated M.D. at Rheims. He travelled with James, the sixth Duke of Hamilton, and when the Radcliffe Camera was opened in 1749 the University of Oxford conferred upon him the degree of Doctor of Physic by diploma. He then settled in London, and was elected physician to St. Bartholomew's Hospital in 1750, a position he resigned in 1780. He was elected an almoner in 1782, and was appointed treasurer of the hospital in 1784. Pitcairn Ward is named after him. He was President of the Royal College of Physicians from 1775 to 1785, and he died in 1791. Dr. William Pitcairn was an accomplished botanist, and was noted for his botanical garden in Upper Street, Islington. It was five acres in extent, and was abundantly stocked with the scarcest and most valuable plants.

DR. DAVID PITCAIRN.

David Pitcairn (Fig. 24) was born in Fife on May 1, 1749, the eldest son of Major John Pitcairn, who was killed at Bunker's Hill. David was educated at the High School, Edinburgh, and afterwards at the University of Glasgow. He went to Cambridge in 1773 and graduated as M.D. in 1784. He was elected Physician to St. Bartholomew's Hospital in 1780, and soon gained a large practice. He deserves mention amongst the notable men attached to St. Bartholomew's Hospital as being the first to draw attention to the fact that valvular disease of the heart is a frequent result of rheumatic fever and because he published this discovery in his teaching at St. Bartholomew's Hospital. Dr. Pitcairn wrote nothing, but it is to his credit that he was instrumental in bringing into notice Dr. Matthew Baillie, the founder of morbid anatomy in England. He died of acute œdema of the glottis on April 17, 1809, and was buried in the family vault at the church of St. Bartholomew's the Less. His last illness is interesting, because his case was one of the first recorded instances of acute œdema of the glottis.

R

JOHN FREAKE.

John Freake (Fig. 25), the son of a surgeon, was born in London in 1681. He was elected assistant surgeon to St. Bartholomew's Hospital in 1726, and soon afterwards became curator of the Museum, then a single room beneath the Cutting Ward. In 1727 it is recorded that "through a tender regard for the deplorable state of blind people the governors think it proper to appoint Dr. John Freake, one of the assistant surgeons of this house, to couch and take care of the diseases of the eyes of such poor persons as shall be thought by him fitt for the operation, and for no other reward than the six shillings and eightpence for each person so couched as is paid on other operations." He was elected surgeon in 1729, and resigned in ′755. In addition to his capacity as a surgeon, he was a judge painting and of music. He was a skilful carver in wood, and the carved chandelier of oak which hangs in the steward's office bears the inscription " Johannis Freake, hujusce nosocomii chirugi, 1735." He was too a pioneer in the science of electricity. He died November 7, 1756, and was buried in the Church of St. Bartholomew the Less under the canopy of a fifteenth-century tomb.

JOHN ABERNETHY.

John Abernethy (Fig. 26) was the son of a London merchant and was born April 3, 1764, his ancestors being of some eminence in Ireland as Nonconformist divines. He was educated at Wolverhampton Grammar School, and was apprenticed to (Sir) Charles Blicke, Surgeon to St. Bartholomew's Hospital, and was also a pupil of John Hunter. He attended the lectures of Percivall Pott, was appointed Demonstrator of Anatomy, and in 1787 was elected Assistant Surgeon, a position he held for 28 years. Abernethy was so successful as a lecturer on anatomy that in 1791 it became necessary to build him a new and larger theatre, and in this theatre he lectured on anatomy, physiology, and surgery, becoming the founder of the modern medical school of St. Bartholomew's Hospital. He died at Enfield in 1831.

Abernethy may justly be looked upon as one of the great reformers and teachers of the medical profession. He taught it honestly, and the sheer force of his personality compelled attention. There is no question that he carried his eccen-

PLATE XXII.

Fig. 23.

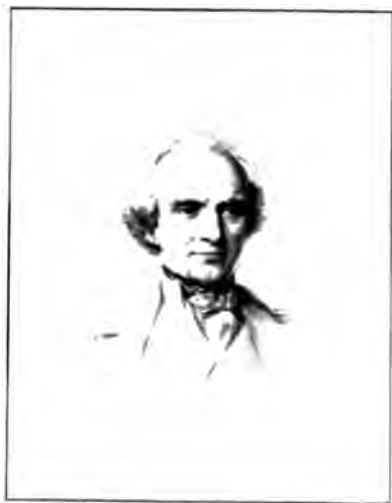
Fig. 24.

PLATE XXIII.

Fig. 25.

Fig. 26.

Fig. 27.

Fig. 28.

tricity beyond all limits, partly owing to a natural irritability and partly as an affectation. Innumerable stories record his rudeness, and perhaps one of the best is that told by the late Lord Tennyson. "A farmer went to the great surgeon, complaining of discomfort in the head—weight and pain. The doctor said 'What quantity of ale do you take ? ' ' Oh, I taaks my yale pretty well.' Abernethy (with great patience and gentleness), ' Now then, to begin the day, breakfast ; what time ? ' ' Oh, at haafe past seven.' ' Ale, then—how much ? ' ' I taaks my quart.' ' Luncheon'? ' ' At eleven o'clock I gets another snack.' ' Ale then ? ' ' Oh, yes ; my pint and a haafe.' ' Dinner ? ' ' Haafe past one.' ' Any ale then ? ' ' Yees, yees ; another quart then.' ' Tea?' ' My tea is at haafe past five.' ' Ale then ? ' ' Noa, noa.' ' Supper ? ' ' Noine o'clock.' ' Ale then ? ' ' Yees, yees ; I taakes my fill then, I goes to sleep arterwards.' Like a lion aroused, Abernethy was up, opened the street door—he was living in Bedford Row—shoved the farmer out, and shouted after him, ' Go home, Sir, and let me never see your face again. Go home, drink your ale and be damned ! ' The farmer rushed out aghast, Abernethy pursuing him down the street with shouts of ' Go home, Sir, and be damned.' " Yet if Abernethy was merciless to patients of this class, he was unsparing in his attentions to those who were deserving objects of pity, and he often sacrificed his private practice to the needs of his hospital patients.
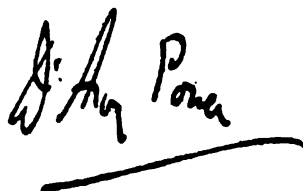
DR. PETER MERE LATHAM.

Peter Mere Latham (Fig. 27), the second son of Dr. John Latham, was born in 1789. He was educated at Sandbach, Cheshire, at Macclesfield, and at Brazenose College, Oxford. He obtained the Chancellor's Prize for Latin Verse in 1809, and graduated M.D. in 1816. He was educated in medicine at St. Bartholomew's Hospital, was elected Physician to the Middlesex Hospital in 1815, and to St. Bartholomew's Hospital in 1824, and became joint Lecturer on Medicine with Dr. Burrows in 1836. In 1836 he published his Lectures on Clinical Medicine, one of the *opera aurea* of physic, wherein he wrote on functional palpitation and on the cardiac physical signs in cases of phthisis in a manner which has never been surpassed. He was, perhaps, the most stimulating teacher on the roll of the physicians of St. Bartholomew's Hospital.

He died at Torquay in 1875, having just entered upon his 87th year.

SIR WILLIAM LAWRENCE.

William Lawrence (Fig. 28) was born in 1783 at Cirencester, the son of William Lawrence, a surgeon. He was apprenticed to Abernethy, who in 1801 appointed him a demonstrator of anatomy, a post he held for 12 years. He was elected assistant surgeon in 1813 and surgeon in 1824, an office he did not resign until 1865. His lectures upon man at the College of Surgeons in 1815-16 brought him into notoriety, for an attempt was made to show that he was undermining the foundations of religion. Ten years later he headed a public agitation against the management of the College of Surgeons. Lawrence did much for the School of St. Bartholomew's, and lectured for 33 years upon surgery with such success that Sir George Humphry, Mr. Luther Holden, and Sir William Savory, amongst many of his pupils, were unanimous in speaking of him as a teacher of first-rate capacity. His treatises on Rupture and on Diseases of the Eye were standard text-books for many years, and may still be read with profit by those who wish to obtain more than a superficial knowledge of the subjects with which they deal. In 1857 Lawrence was appointed serjeant surgeon to Queen Victoria ; in 1867 he was created a baronet, and on April 30, 1867, he died, leaving his title to his son Trevor, who as Sir Trevor Lawrence has acted for several years as treasurer of the hospital with which his father was so long connected.

For the drawings and photographs illustrating these two articles, I am greatly indebted to Mr. A. Russell Baker, Dr. Norman Moore, Mr. W. H. H. Jessop, the Rev. W. Ostle, Mr. W. H. Cross, Dr. Leonard P. Mark, Mr. Sidney Young, F.S.A., and the Council of the Royal Medical and Chirurgical Society, who have either allowed me to select views from their collections, or have given me permission to photograph various parts of the hospital.

Reviews of Books.

A Manual of Surgery. By ALEXIS THOMSON, M.D.,
F.R.C.S. Edin., Assistant Surgeon, Edinburgh Royal Infir-
mary, and Surgeon to the Deaconess Hospital, Edinburgh ;
and ALEXANDER MILES, M.D., F.R.C.S.Edin., Assistant
Surgeon, Edinburgh Royal Infirmary, and Surgeon to the
Leith Hospital. Two Volumes. Edinburgh and London :
Young J. Pentland. Pp. 763 and 723. 318 illustrations.
Price 21s. net.

THE issue of a new text-book on surgery is always an occasion
of interest to surgical teachers, and the more so when it comes
from such a splendid school as that of Edinburgh, which has
behind it a history and traditions which are second to none in
this country. Surgery is now such an extensive subject that
it is almost impossible for any one man to write an up-to-date
text-book " on his own," and, very wisely, the collaboration
of two workers has been secured for this purpose. Moreover,
acknowledgment is made to Dr. Logan Turner for contribu-
tions on the affections of the nose, ear, and larynx, whilst
Dr. Luke has been responsible for the section on anæsthetics.
The Anatomical Museum of the University has been laid under
contribution to provide illustrations, as also the Museum of the
Royal College of Surgeons of Edinburgh, and these have been
supplemented by photographs, &c., in the possession of the
authors. The work is divided into two portions, dealing
respectively with general and regional surgery.

The ideal which the authors set before them has been to
give a systematic view of the present-day aspects of surgery in
sufficient detail to render it useful to the practitioner, without
at the same time carrying it beyond the scope of a student's
manual. After looking carefully through the work we have
come to the deliberate conclusion that whilst it may serve as
a student's handbook, arranged systematically, and giving a
sufficient insight into the modern ideas of the subject, it will
scarcely serve as a guide to practitioners, since the sections

devoted to treatment are not detailed with sufficient elabora-
tion.   The method in which various diseases are described
according to their bacteriological origin, and indicating the
modifications which are due to variations in the causative
microbes, is most excellent; thus separate sections are intro-
duced to deal with pneumococcic peritonitis, and that of
gonorrhœal origin in addition to the main sections devoted
to peritonitis due to the ordinary pyogenic bacteria.   Em-
pyema, osteomyelitis, arthritis, and various other lesions are
similarly discussed according to their bacterial origin.   At the
same time pathological descriptions are not unduly weighted,
and no attempt is made to illustrate pathological processes.
Possibly an exception to this rule might with advantage have
been allowed in connection with inflammation, and repair of
wounds, which certainly fall within the scope of the surgeon's
teaching.   In dealing with the regions each is introduced with
a short but useful account of the surgical anatomy and method
of examination, and this is decidedly advantageous.   Other-
wise the book follows closely, and at times very closely, along
the lines of other well-known text-books of surgery.

The weakest point of the whole work is in the matter of
illustrations, for although there are many, they are of very
poor quality.   Almost all of them are wood blocks, and many
of them of the crudest description, the nature of which it
would be impossible to recognise, apart from the letterpress
description, and even then some are almost incomprehensible.
Especially is this the case in some of the intestinal and
abdominal pictures which are ridiculously bad : *e.g.*, Figs. 82,
89, 91 and 95 in the second volume.   One would have thought,
too, that in describing cancer of the breast, it might have been
possible to find something in the shape of effective illustrations
besides the two included, viz., cancer of the male breast and
the elephantoid state of the arm in the latest stage of the
disease.   There is not a single reproduction of a skiagram,
although one or two outline drawings of skiagrams are included
in the section on fractures.

Naturally there are a few slips in statements and arrange-
ments that call for modification.   Thus on page 13 we are told
that the erysipelas organisms have but little tendency to pass
beyond the point at which they gain access to the body,

although a correct description is given elsewhere. On page 256, under the main heading Arteritis, are included sections dealing with thrombosis and phlebitis. We are also told here that atheroma and primary calcification of arteries are the same thing, which is not usually accepted as a fact. There is no notice of Crile's recent work on shock, which is an omission we should not expect, and we doubt the wisdom of the recommendation of Gritti's amputation for senile gangrene on page 98. However, the general standard of excellence is such that we do not wish to pick holes, which will doubtless disappear in new editions. That the work will live and successfully pass through many editions we have no doubt.

Lectures on Diseases of the Nervous System. By SIR WILLIAM R. GOWERS, M.D., F.R.C.P., F.R.S. London: J. and A. Churchill. Price 6s. net.

THE object of the ten lectures here collected and revised is stated in the preface to be the promotion of accurately observed and precisely recorded facts. The first two are devoted to a consideration of abnormal visual and auditory sensations, whilst the remainder deal with some of the more unusual forms of nervous disease, and include a lecture upon the use of drugs. In addition to the discussion of pathology and symptoms, there are given many valuable hints and suggestions upon prognosis and treatment drawn from the wide experience and mature reflection of the author.

The Nervous Affections of the Heart. By GEORGE ALEX-ANDER GIBSON, M.D., B.Sc., F.R.C.P.Ed., F.R.S.E. London and Edinburgh : Young J. Pentland. Pp. 99.

THIS book consists of the six lectures delivered before the Royal College of Physicians in Edinburgh when the author was the Morison Lecturer (1902–1903).

The first three lectures are devoted to the sensory disturbances of the heart, the last three to motor affections.

The first lecture deals with historical instances of Angina Pectoris and with the literature of the subject. Several interesting diagrams are given showing areas over which pain was referred in different cases. The author falls foul of Osler in the classification of Angina into " true " and " false," or Pseudo-angina. He, however, does not do that writer justice, as Osler

applies the term false angina chiefly to those cases which occur in women as a rule, and frequently where mitral stenosis is present. Osler gives a table by Huchard to show the differences which are found clinically between the latter type and the typical cases of angina with aortic lesions.

The anatomy of the cardiac nerves is the subject of Lecture II. The theories of the actual cause of the pain are to a certain extent neglected.

In the third lecture the treatment of the attack and of the pain is given very fully, and a useful note on the administration of colchicum in such conditions is added. Iodides and the nitrites are strongly recommended. No mention of morphia injections or chloroform inhalations is made, and the treatment of the less severe forms of pain might have received more notice.

Lecture IV. is concerned with alterations in the rate of the heart beat. It is clear and concise. Cardiac rhythm is fully dealt with in Lecture V. We are quite in accord with the author in condemning the prevalent custom of giving a sinister prognosis in many cases of irregularity of the heart. Some mention of drugs which produce irregularity in certain individuals would have been advantageous.

The last lecture is devoted to the mechanism of the force of the heart's action and its alterations. The latter part on asystole is particularly interesting and instructive.

As the author says in the last paragraph, the lectures were meant to be suggestive rather than exhaustive, and in the time and space at his disposal many interesting and important facts have been brought forward. It is not exhaustive enough for a textbook, but is useful for those interested in advanced medicine.

Lectures on Clinical Psychiatry. By Dr. EMIL KRAEPELIN, Professor of Psychiatry in the University of Munich. Authorised translation from the German, revised and edited by Thomas Johnstone, M.D. Edin., M.R.C.P. Lond. London : Bailliere, Tindall and Cox. Price 10s. 6d. net.

As the editor remarks in his preface, " No apology is needed for the reproduction in English of any of Dr. Kraepelin's works." Indeed, we ought to be grateful to the translator

for putting the lectures contained in this volume into the hands of English readers who are not too conversant with the German tongue. The author has the power of drawing a vivid word-picture of the patients upon whom he lectures, and the book is most interesting to read as well as most instructive. It is throughout essentially practical. We hope that it will find a wide circle of readers.

Blood Pressure in Surgery. The Cartwright Prize Essay for 1903. By GEORGE W. CRILE, A.M., M.D., Professor of Clinical Surgery, Western Reserve Medical College; Visiting Surgeon to St. Alexis Hospital, &c. Philadelphia and London : J. B. Lippincott & Co. 422 pages. 94 illustrations. Price 18s. net.

THIS work contains an elaborate record of experimental and clinical researches into the question of the cause of the fall of blood-pressure in surgical shock and the best means of coping with it. The author's previous work on shock is well known, and we have here a contribution which runs on very similar lines. Starting with the fact that there is no generally-accepted treatment for the low blood-pressure observed in shock—one surgeon relies on alcohol, another gives digitalis, a third strychnine, others various combinations, including "synergists and antagonists simultaneously"—Dr. Crile points out that surely this difference of opinion is not reasonable, and indicates that the cause of the lowered blood-pressure cannot be generally recognised, or a more general conformity in practice would be observed. By a process of elimination it can be proved that the real cause is exhaustion of the vasomotor centre.

A careful record of 251 experiments constitutes the main bulk of the work. These were employed to demonstrate the effects on the blood-pressure of the various agents used in the treatment of shock, first when applied to healthy animals, and subsequently to those in a condition of surgical shock. Many interesting results were obtained. Thus alcohol has no effect in small doses, and in large ones rather tends to lower the blood-pressure. Strychnine has no influence except in mild cases. Saline infusion causes a gradual rise in blood-pressure, but cannot be carried very far, or too great an accumulation occurs in the splanchnic area, and may cause embarrassment to

the respiration. The author's experiments indicate adrenalin as the drug of choice. It should be given as an intravenous injection in a dilution of about 1 in 50,000, and must be introduced slowly and continuously, so as to maintain the action which is otherwise transitory. Curious results have been obtained in the resuscitation of animals apparently dead by this means, and in a patient with a crushed skull admitted to Lakeside Hospital, whose heart had ceased beating for nine minutes, restoration of the heart's action for 31 minutes was obtained by this method. During this interval depressed bone was elevated, and the patient moved his head, but he did not recover. There can be no question that in this method we have apparently a valuable and potent therapeutic agent, but its clinical value has yet to be demonstrated.

Dr. Crile has also shown that the amount of atmospheric pressure, exercised upon the exterior of the body, has a considerable influence on the blood-pressure, and he has designed a pneumatic suit of a double layer of specially-made rubber, which can as a whole or in segments be inflated by a bicycle-pump, thereby producing an artificial peripheral resistance, which promptly increases the general blood-pressure when it is brought into action. Charts are shown in which the influence of the "pressure-suit" on the blood-pressure and pulse-rate are demonstrated during operations, *e.g.*, removal of the Gasserian ganglion, in which shock had become manifest.

We congratulate Dr. Crile on the valuable addition to our knowledge which he has made by his work ; the record of his experiments will prevent useless efforts in repetition of the same, and practical surgeons may expect to derive real assistance along the lines he has indicated. The work is a classical illustration of the way in which a difficult problem should be attacked, and, if practicable, solved.

Mediterranean Winter Resorts: a Complete and Practical Handbook to the Principal Health and Pleasure Resorts on the Shores of the Mediterranean. By EUSTACE A. REYNOLDS-BALL, F.R.G.S. London : Hazell, Watson, and Viney, Ltd. Price 6s.

THE fifth edition of this exceedingly useful little book has just been issued. It has been revised, enlarged, and to a great

extent rewritten, and though much additional information has been afforded, its bulk has, by the use of specially thin India paper, not been materially increased. In addition to the most complete and precise information concerning the various resorts, this little volume gives very useful details of the nature of the society to be met with, and the names of the English medical practitioners who are resident there. The articles on the climatic and sanitary conditions by well-known medical men combine to make this handy book an indispensable companion to all in search of health.

Medical Hints and Notes on Egypt as a Winter Resort, with a Short Account of Helouan and its Sulphur Baths. By ARTHUR J. M. BENTLEY, M.D., M.CH., M.R.C.S. (Eng.), of Cairo.

THIS neat little volume, based on a paper read before the British Medical Association, has reached its sixth edition. To state this, in connection with the name of its author, is at once to commend it to the notice of travellers to Egypt in search of health. It is carefully and brightly written, and made additionally attractive by its beautiful illustrations.

The Ambulance in Civil Life and the Proceedings of the Metropolitan Street Ambulance Association. By REGINALD HARRISON, F.R.C.S., President of the Association, and Knight of Grace of the Order of St. John of Jerusalem in England.

THIS pamphlet is mainly a plea for a more complete organisation in the metropolis of the arrangements for ambulance work, and for speedier and more skilled conveyance of cases to the nearest hospitals. Mr. Harrison is supported in his views by the most eminent medical men, and makes out a very strong case.

Football Injuries. By A. H. ANGLIN WHITELOCKE, M.D., F.R.C.S. Eng. ; Lecturer on Clinical Surgery in the University of Oxford, and Surgeon to the Radcliffe Infirmary. London : J. and A. Churchill. Pages 16. Price 1s.

THIS paper, read before the "Medical Officers of Schools Association," touches lightly on many of the more serious injuries resulting from football, and is mainly noticeable on account of

the emphasis laid on the treatment of sprained joints.   The author is rightly insistent that splints and prolonged immobilisation are undesirable, and trusts entirely in elastic pressure obtained by means of layers of cotton-wool firmly bandaged on until all effusion has disappeared ; he then institutes massage and exercises against resistance.   We heartily recommend this work to those who have frequently to deal with such injuries.

An Essay on Beri-Beri.   Printed by the Board of Trinity College, Dublin, for the author ; and " *Beri-Beri,*" *its Symptoms and Symptomatic Treatment* (being extracts from the foregoing).   By PERCY NETTERVILLE GERARD, B.A., B.CH., M.D., District Surgeon, Federated Malay States.   London : J. and A. Churchill.   Price 1s. 6d.

THESE small books epitomise in a concise yet complete form a very great deal of information concerning beri-beri based on the author's wide experience of the disease.   No one going to a beri-beri district could do better than provide himself with the essay or its smaller companion.

First Report of the Wellcome Research Laboratories at the Gordon Memorial College, Khartoum.   By the Director, ANDREW BALFOUR, M.D., &c.   (Department of Education, Sudan Government, Khartoum.)

THIS first report of the Research Laboratories established at the Gordon Memorial College in Khartoum through the munificence of Mr. H. S. Wellcome is of considerable interest. It opens with a description of the laboratories, after which mosquito work in the district is detailed, together with observations on the use of chrysoidine as a killing agent for larvæ and pupæ.   Other articles are on biting flies of the Sudan, eosinophilia in bilharzia, and guinea-worm infections, insects and vegetable parasites injurious to crops, and a report on the general routine work of the laboratory.   A valuable monograph by Mr. Theobald on the mosquitoes of Egypt and the Sudan, many new species being described, concludes the volume which is well illustrated, the coloured plates of mosquitoes, &c. being beantifully reproduced.   We congratulate Dr. Balfour on his first year's work.

Bacteriology and the Public Health. By GEORGE NEWMAN, M.D., F.R.S.E., D.P.H., formerly Demonstrator of Bacteriology in King's College, London, &c. ; Medical Officer of Health of the Metropolitan Borough of Finsbury ; Joint Author of *Bacteriology of Milk.* London : John Murray. Pp. 497. Price 21s. net.

THIS third edition of Dr. Newman's well-known work gives an excellent general account of the science and applications of bacteriology. In successive chapters the biology of bacteria, bacteria in water, air, and soil, in fermentations, in milk, milk products and foods are dealt with, and lucid and accurate descriptions of the bacterial treatment of sewage, bacteria and disease, tropical diseases, immunity and antitoxine, and disinfection are given. The chapter on tuberculosis, as might be expected, is a particularly good one. The work is thoroughly up to date, and no fact of any importance seems to have been omitted. An appendix on bacteriological technique concludes the volume, which is illustrated with a number of figures and capital plates.

Clinical Diagnostic Bacteriology, including Serum Diagnosis and Cyto-diagnosis. By ALFRED C. COLES, M.D., D.Sc. London : J. and A. Churchill. Pp. 237. Price 8s. net.

THE author of this work, in his preface, makes the statement, " With so many excellent works on bacteriology now obtainable, it may seem necessary to give some reason for the production of a small book with such an ambitious title." We are not sure that the reason given is an adequate one, but, be that as it may, Dr. Coles has collected together a great deal of useful information. Nearly one half of the volume is devoted to the acid-fast bacilli and a method of differentiation based on staining methods is detailed and should prove very useful. The microbes of pus, pneumonia, diphtheria, anthrax, &c., are dealt with briefly in subsequent pages, and the book concludes with chapters on serum and cyto-diagnosis. The latter is a somewhat new branch, and one worthy of further study, although some difference of opinion still exists as to its value. For the general practitioner, who does not want to be over burdened with laboratory methods, the book will prove a useful guide.

The Pathology of the Eye. By J. HERBERT PARSONS, B.S., D.Sc. (Lond.), F.R.C.S. (Eng.); Assistant Ophthalmic Surgeon, University College Hospital ; Curator and Pathologist, Royal London Ophthalmic Hospital; Lecturer on Physiological Optics, University College, London. Vol. I., Histology. 27, Paternoster Row, London : Hodder and Stoughton. 1904. Price £2 net to subscribers. Separate vols. 15s. net.

A WORK in the English language dealing in a systematic manner with all that is known concerning the Pathology of the Eye has been a long-felt want. We welcome with pleasure Mr. J. Herbert Parsons' first volume on this subject, the high standard of which, if maintained in the three succeeding volumes, will supply all that could be desired in this direction.

The first volume includes the pathological histology of the lids, conjunctiva, cornea, sclerotic, iris, anterior chamber and ciliary body, together with the bacteriology of the conjunctiva. Volume II. will treat in a similar way, the pathological histology of the other structures of the eye. In Volumes III. and IV. the diseases which affect the eye as a whole will be discussed, and an endeavour made to trace them to their ultimate causes. They will, therefore, include such conditions as glaucoma, sympathetic ophthalmia, and congenital malformations.

In each structure which is dealt with in the present volume a description is first given of the normal histology ; this is purposely not of an exhaustive character, those features being specially dealt with which have a bearing on pathology. The changes produced by the different forms of inflammation of the structure are then described, afterwards any degenerations or pigmentation to which it may be liable, and finally the cystic formations and tumours of the part. After the description of each disease a number of references are given to the works of writers who have been quoted. An examination of these references shows a large preponderance of German authors, though ample justice has been done throughout the book to the work of British investigators. The comparatively few British workers, who have devoted themselves to original pathological research in connection with the eye, may be partly attributed to the want of a comprehensive guide, not

only to the main roads and highways of the subject, but also to the tracks and bridle-paths which lead to its at present unexplored districts.

This want Mr. Parsons' book undoubtedly supplies. We have carefully read through the volume, and can find hardly any subject the latest work in connection with which is not referred to.

A work on Pathology without illustrations is comparable to one on geography without maps. Mr. Parsons has recognised this, and has enriched his work with 267 figures. These are for the reader most conveniently placed in the text, each in close proximity to the subject which it depicts. Many of them have been reproduced from articles in the *Transactions of the Ophthalmological Society,* but the majority are from photo-micrographs taken by Mr. Parsons himself. These latter are much above the general average of reproductions from photo-micrographs,. and anyone who has any knowledge of histology can clearly recognise the points they are intended to show.

In conclusion we have to congratulate the publishers on the general get-up of this which, we believe, is one of their first ventures in the publication of medical books.

Elementary Ophthalmic Optics. By FREELAND FERGUS, M.D., F.R.S.E., Surgeon to the Glasgow Eye Infirmary, &c. London : Blackie and Son, Limited.

THIS small book has been published with a view of giving, " in a clear and simple manner, those portions of physical and geometrical optics which I consider essential to the medical student beginning his ophthalmic studies." It is not quite obvious why the title "Ophthalmic Optics" is used at all. A book with the same title was published a year or two ago by another author, and this really did go into the question of ophthalmic optics, but the book at present under review barely touches on the eye at all. It is chiefly occupied with describing the properties of lenses and mirrors ; and, however good it may be from a purely physical point of view, it is by no means a book that we should feel inclined to recommend to students as a trustworthy guide from which to learn their ophthalmic optics.

A Handbook of the Diseases of the Eye and their Treatment.
By HENRY R. SWANZY, A.M., M.B., F.R.C.S.I. 8th
edition. London : H. K. Lewis. 12s. 6d.

THIS is one of the the best known text-books on diseases
of the eye, and it says much for the way it is appreciated
that it has now come to the eighth edition. Those who have
known this book during the whole course of its existence,
which is somewhere about fifteen years, have successively
welcomed the succeeding editions, each of which has shown
some improvements on the preceding ones. There is one
most useful feature in this book, which is that, although its
size does not exceed 654 pages, yet there is hardly any-
thing in ophthalmic work which is not at least referred to
therein. The book is, in other words thoroughly up to date,
and the numerous references to the literature in any
matter discussed show that great care has been taken in
looking up the latest papers dealing with the subject. In
a short note like the present we have not space to point out
the numerous ways in which this edition is ahead of its
predecessors, but we may say that much that is new con-
cerning diseases of the cornea and optic nerve, and relating
to sympathetic ophthalmitis, will be found mentioned ; while a
more detailed description is given of the use of the magnet for
the removal of foreign bodies from the eye, as well as opera-
tions such as Pfluger's method of doing tarsorrhaphy, Kühnt's
method of extirpation of the lachrymal sac, Maxwell's operation
for shrunken socket, and Krönlein's operation of temporary
resection of the outer wall of the orbit. When we have so
many excellent books on diseases of the eye, as we have at
present, it is sometimes difficult to come to the conclusion as
to which is the best. Without in any way reflecting on other
first-rate works, we must say that we know of no book of
equal size that contains so much information and such a useful
selection of points for discussion.

Modern Methods in the Surgery of Paralysis. By A. H.
TUBBY, M.S. (Lond.), F.R.C.S., and ROBERT JONES,
F.R.C.S.E. Pp. 331, with 93 illustrations. London :
Macmillan & Co., Ltd.

THIS work begins with a chapter on Infantile Paralysis, its
ætiology, pathology, general treatment, and the production of

deformity. The practical portion of the chapter is composed of a useful statement of an item of the teaching of the late H. O. Thomas, of Liverpool, and its application. This is to the effect that a muscle or group of muscles may often appear to be paralysed when they are only suffering from the effects of a persistence of the over-stretching that remains from a previous paralysis. Thus most surgeons have met with cases of " dropped wrist" from injury to the musculo-spiral nerve in fractures of the lower end of the humerus, and have found that fixation of the wrist on a splint, in the position of hyperextension, considerably hastens the return of power in the extensor muscles. It has similarly been found empirically that sections of the tendons of (apparently) paralysed muscles sometimes effect their recovery of power. In the work under notice instances are quoted of the return of power in cases of " dropped wrist " from infantile paralysis, when the same principle of treatment has been applied. The surgeon naturally turns to see what advances have been made in the very troublesome paralytic conditions affecting the trunk or upper extremities. It must be confessed that not much solid advance is to be found here. Severely paralysed trunks will still gradually collapse in spite of supports, and there are not many patients, who suffer from paralysis of the shoulder, caused by injury to the upper root of the brachial plexus, who will consent to undergo an extensive transplantation of muscles. It is in this type of paralysis, as well as in certain cases of infantile paralysis, that nerve-transplantation has of late had promising results, and, by the time the next edition of this work appears, it is possible that experience in this direction will have accumulated. With regard to paralysis of the lower extremities the modern improvements of tendon-transplantation are fairly well illustrated, but many of the figures are on too small a scale to serve as a guide to those, who may wish to perform the actual operations referred to. The book will do good service in helping to draw the attention of the profession to the scope that exists for experienced surgery in a wide variety of paralytic affections.

*Lectures, chiefly Clinical and Practical, on Diseases of the Lungs
and the Heart.* By JAMES ALEXANDER LINDSAY, M.D.,
F.R.C.P. (Lond.), M.A., Professor of Medicine, Queen's
College, Belfast, &c.   London : Baillière, Tindall, and Cox.
Price 9s. net.

WE learn from the preface to this book that the Lectures
contained in it have been delivered for the most part to clinical
classes at the Royal Victoria Hospital.   They deal from a
practical point of view with the symptoms, diagnosis, and
treatment of thoracic disease.   The information given is full
and clear, and the chapters dealing with pulmonary tuberculosis
are especially commendable for their detailed and common-
sense consideration of the many problems connected with this
disease.   Professor Lindsay takes the reasonable view of sana-
torium treatment of phthisis, that it will do much in suitable
cases, but not everything in all cases as some unreasonable
enthusiasts have seemed to expect.   A useful section of the
book deals with the climatic treatment of phthisis, and gives
sensible advice as to the classes of cases likely to benefit at
different health resorts.   In short, we think that Professor
Lindsay did well to publish these Lectures, and we commend
them to the study of both students and practitioners.   By way
of minor criticism we venture to suggest that the word *crepitus*
hardly needs a plural, and that in any case the plural would be
crepitūs and not *crepiti.*   Such a phrase as " a few casual spits
of blood " also strikes one as scarcely elegant.

Dispensing made Easy.   With numerous formulæ and practical
hints to secure simplicity, rapidity, and economy.   By
WILLIAM G. SUTHERLAND, M.B.   Bristol : John Wright
& Co.   Price 3s. 6d. net.

THIS work has been compiled for the use of busy country
practitioners who have not already prepared a pharmacopœia
of their own.   In scope, notwithstanding its brevity, it will
no doubt prove to be much more comprehensive than such
individual compilations usually are.   It contains many admirable
notes as to the furnishing of a dispensary and the selection
of remedies.   The author seems to be greatly impressed by
what he considers the needless cost of the official preparations

of drugs, and therefore has expended considerable trouble in collecting economical formulæ. A short section of the book is devoted to the needs of a parish practice. The author has succeeded in producing a work which will be much appreciated by those whom he desires to serve.

Syphilis and Gonorrhœa. By C. F. MARSHALL, M.D., CH.B., B.Sc. (Vict.), F.R.C.S. (Eng.), Senior Assistant Surgeon to the Hospital for Diseases of the Skin, Blackfriars, London. London and New York : Rebman. Price 8s. net.

IN this little book Dr. Marshall gives a good account of Syphilis and Gonorrhœa, a salient feature of the work being that repeated reference is made to the writings of most of the best English and Foreign authorities upon the subject, and these references are clearly set forth at the end of each chapter and also at the end of the book. Chapters 1 and 19 contain interesting historical accounts of each disease, which are well worth careful study. It is stated that Syphilis existed amongst the Chinese 5,000 years ago, thus confirming the old adage that there is " nothing new under the sun." Chapter 10 gives an account of parasyphilitic affections, and the author states that these are more numerous than is generally supposed. Amongst the list we find hysteria and hereditary tabes, spira bifida and congenital club-foot. At the same time the writer suggests that parasyphilitic affections have been rather overstated. There is a useful chapter on Syphilis and Life Assurance. The complications of gonorrhœa in the male and female are fully described and their treatment discussed. The last chapter deals at some length with venereal disease in the Army and Navy, and gives some trustworthy figures which appear to establish the advantages derivable from the working of the Contagious Diseases Acts. The writer ends his valuable little book, which we can highly recommend to the notice of the profession, by saying, " If the State expects the army to protect the country, it is the duty of the State to protect the army against disease of any kind, whether of venereal origin or not."

Notes by the Way.

<div style="float:left">**The Medical Service of the Army.**</div>

THE appointment of Surgeon-General A. H. Keogh to be Director-General of the Army Medical Corps has been hailed with profound satisfaction by all who are sufficiently enlightened and patriotic to place the efficiency of the Service above merely personal considerations. The officer selected for that responsible post has a brilliant record of service, and has given proof of great administrative and organizing capacity. Moreover, while a thoroughly smart officer, he is something more : he is a good doctor, proud of his profession, who may be trusted to see that officers under his direction do not forget that their chief duty is not to excel in billiards and polo, or even dance attendance on the wives of generals, but to keep themselves abreast of the advance of medical science which it is their business to apply to the prevention and cure of disease among the troops committed to their care. It is beyond question that the medical officers of the army, as a class, were, till lately, distinctly below the level of medical practitioners in civil life, in respect both of general education and professional knowledge. This fact was perfectly appreciated by the combatant officers, and to this cause their attitude of open hostility, or half contemptuous tolerance, towards the army doctors was mainly due. As Professor Ogston pointed out, the inferiority of the army medical officers was in large measure attributable to the want of opportunities of increasing or even keeping up their professional knowledge. Besides this, from the very conditions of the Service, merit in their proper sphere of activity counted for little or nothing towards promotion ; and there was no encouragement to aim at anything more than the punctual discharge of their routine duties. Since the reorganization of the Service by Mr. Brodrick the standard of efficiency has been very considerably raised, and medical officers have now the chance of winning distinction and more solid advantages by scientific work and the cultivation of special skill. Of this new order of things Surgeon-General Keogh is

the representative, and as such he is obnoxious to lovers of the old system, when promotion was given, like the Order of the Garter, without regard to " any d——d merit." Moreover, his promotion has been comparatively rapid, and the officers over whose heads he has passed feel themselves aggrieved. This, as Mr. Pecksniff would have said, is human nature. The new Director-General may, with the elder Pitt, plead guilty to "the atrocious crime of being a young man." In the eyes of those who wish to see the medical service of the army in a thoroughly efficient state, that fact in itself is one of the most satisfactory features in the appointment. The selection of an officer, so low down in the military hierarchy, is the proclamation of the new and salutary principle that the first condition of promotion is not seniority, but capacity. The army and the nation are to be congratulated on an appointment which marks a new epoch in the history of the Army Medical Service. Had the Advisory Board done nothing else, its recommendation of Surgeon-General Keogh for the post of Director-General, in the face of bitter and not too scrupulous opposition, would alone justify its existence.

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Russia's Preparation for War. MAJOR Louis Livingston Seaman, late surgeon in the United States Volunteer Engineers, who had the fullest opportunities of studying the medical arrangements of the Japanese and the Russians in the present war, gives, in the January number of the *Journal of the Association of Military Surgeons of the United States*, an account of the marvellous forethought, with which every detail was arranged, and every contingency provided for by the Japanese. On the other hand, the Russians were totally unprepared, because till war was actually upon them they did not believe that the Japanese were in earnest. Major Seaman relates a conversation which he had with the brother-in-law of the Russian Surgeon-General at Vladivostok. The latter had said to his relative, " Oh, there will be no war. If Russia expected war, I should be the first to know it, so that my hospitals could be in readiness. As it is, I have never been so short of supplies as I am to-day. There will be no war." That night Togo torpedoed the

Russian Squadron and sealed up Port Arthur. Major Seaman adds that what was true of the Russian Medical Corps was equally true of every branch of the Russian Service in Manchuria. Arriving trains, that should have been crowded with men and munitions of war, brought in each a full complement of the *demi-monde* and vodka. "Sodom and Gomorrah, the current synonyms of Port Arthur and Vladivostok, in the Orient, were temples of virtue in comparison to the debauchery, licentiousness, flagrant immoralities, and openly-flaunted vice recently practised in those unhappy cities. This was Russia's preparation for war."

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Sir Frederick Treves on London Hospitals. IN speaking on behalf of the Hospital Sunday Fund the other day Sir Frederick Treves remarked that, owing to the advance of medicine and surgery, there were now innumerable methods of treatment requiring special appliances and antiseptic conditions which were hardly attainable in private houses, and the work of the hospitals therefore played a more important part than formerly, and was directly beneficial to different classes of the population. The London hospitals were metropolitan only in their locality. Patients were to be found in every London hospital from every part of the country and from practically every colony under the British flag. If any of them heard of a friend's being injured in the country, almost the first remark they made was, "Well, I do hope he has fallen into the hands of a competent surgeon." Nobody ever stopped to think where such competence was obtained. It seemed a little astounding that the medical education of this country depended entirely on the voluntary hospitals, and to an overwhelming extent on the voluntary hospitals in London. If they inquired what the subscribers to hospitals got for their money, he would, taking but one instance, ask what they thought was the commercial value to the world of antiseptic surgery as introduced by Lord Lister ? This boon without price was a free gift to the world, after no State grant, no huge sum subscribed to carry on an inquiry, from a solitary man working in a hospital supported by voluntary contributions. In the London Hospital alone there

were treated 183,000 new out-patients in one year, more than the whole population of Brighton. Filing past at the rate of four a minute, night and day, they would take a month to go by. The number of pills made in that hospital greatly exceeded one million per annum. Every one knew Epsom salts, usually purchased by the ounce or half-ounce. The London Hospital got through three tons a year. Of carbolic acid three tons also were used. One item in this curious bill was a little pathetic. Æther they knew to be very light, and in such a home æther was only used to relieve pain and to make persons unconscious during operations. Could they imagine what a perfectly appalling and hideous amount of pain and suffering would be covered by the amount of æther and chloroform used in this hospital—one and a half tons ? The amount of lint used would stretch 75 miles ; and of cotton wool, a fairly light thing, eight tons per annum were consumed. Similar remarks, in varying proportions, would of course apply to all the hospitals in the metropolis ; and thus some idea of their beneficent work could be realised.

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Physical Education. FOLLOWING up the resolution to which we referred last month, which had the support of Sir William Church, Sir Lauder Brunton, and Sir William Broadbent, and which urged the establishment of a national system of physical education, Sir Lauder Brunton at the Conference of Head-Teachers read a paper on "The proposed National League for Physical Education and Improvement," and gave an address on the same subject at the meeting of the Incorporated Society of the Medical Officers of Health. He said that the subject was one of vital necessity to the welfare, even to the very existence, of our Empire. In the hands of the teachers rested the training of the coming generation, training—mental, physical, and moral. To insist upon mental training, without regard to physical, was imitating the conduct of Pharaoh who required bricks to be made without straw. The teacher therefore must instruct his pupils that health to a poor man was more than money at the bank to the rich, for upon it depended his livelihood as well as his happiness. If we could increase the healthy development of

our children they would not only be more fit for work of all kinds, but they would resist disease more easily. Physical training was a most powerful agency for development. It formed the proper complement to mental training and ought to be threefold. It ought to develop (1) the muscles by which movements were executed, (2) the nerve centres in the cord and cerebral ganglia by which the movements were co-ordinated, and (3) the brain, by which all the movements received a purposive direction. For higher co-ordination there was nothing so good as games of ball of all sorts, and there was no doubt that through the world's history such games have held a very high place. Suitable playgrounds, then, were as essential as suitable school-houses, and with the assistance of the medical officers, children might be classified according to their physical strength, and their games regulated accordingly. Drilling, with proper regulations, was invaluable for teaching habits of prompt obedience and action. But all this physical training involved waste of muscle and waste of nerve, and the question of proper feeding became a very serious one. To meet this difficulty Sir Lauder Brunton advocated the establishment of cooking classes at which the children not only cooked, but ate the food.

No one is more alive than the general practitioner to the lamentable ignorance displayed by the poorer classes in the most elementary principles of economical cooking, as well as in those of ventilation and sanitation, and our public teachers might vary and lighten their daily toil by judicious attention to these points, and thus confer an incalculable benefit upon the next generation. If, therefore, medical officers and school teachers combined with other benevolent persons, who had the welfare of the nation at heart, they would be able to carry out thoroughly the measures which the proposed league contemplated.

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Zomotherapy. IN the January number of this journal our readers will remember that there was an extremely interesting article upon this subject by Dr. R. W. Philip of Edinburgh. Zomotherapy, he remarked, consists in the systematic, continued exhibition of

raw meat, or raw meat juice, in the treatment of pulmonary tuberculosis, which is a distinct therapeutic procedure, determined by the needs of the patient, as shown by experimental and clinical observation. In 1900 Héricourt and Richet published their results of experiments performed upon dogs, which were artificially inoculated with tuberculosis, and these experiments showed that whereas these animals lost weight when fed in the ordinary way, and on cooked meat, they actually gained weight when fed on raw meat. Dr. Philip's facts are based upon clinical experience. He finds that his patients, treated in this way, improve in general aspect, that there is a distinct gain in weight, which is accompanied by firmness of tissue, and that soft flabby muscles become firmer, while myotatic irritability lessens. The pulse becomes slower, vascular tone is increased, and the temperature is steadier. Dyspepsia and flatulence tend to lessen. The blood changes are remarkable, there is an increase in digestive leucocytosis, and the hæmoglobin increases 10 to 20 per cent. The local lesions improve, active changes diminish, and even become quiescent, while cicatrisation advances. It is found that the patient soon develops a liking for the raw meat. Héricourt and Richet hold that the raw meat exerts some specific influence on tuberculosis. Dr. Galbraith, in an able article in our present number, shows that, as the result of experimental investigation on patients, the process is probably simply a physiological one ; in other words, that it is a direct effect on nitrogenous metabolism. It is a well-known fact that the nutritive value of a diet depends mainly upon the amount of carbon and nitrogen which it contains in a readily digestible and assimilable form, and in order that nitrogenous equilibrium may be maintained, the intake of nitrogen in the proteid food must at any rate equal the output as estimated by that which occurs in the urine and fæces. If " flesh is to be put on," that is, if the muscles are to increase in size and tone, the nitrogen and carbon intake must be slightly in excess of the output. Muscular wasting is a marked feature in tuberculosis, and this occurs not only in the striped, but also in the unstriped muscle of the body. This muscle atrophy is accompanied by an increased irritability, and these changes are probably brought about by a toxin. We may look upon the condition as

an increased nitrogenous katabolism brought about by toxins which are circulating in the body. It has been stated that during the time that the patients are being fed on raw meat that there is a digestive leucocytosis, the increase in number being chiefly in the lymphocytes. This is associated with increased absorption of digested proteid from the alimentary canal, which is on its way to build up the proteids in the body. The conclusions drawn from the experiments of Dr. Galbraith are that the proteid of uncooked meat is more readily digested and absorbed, and that the contained nitrogen is more readily retained, increasingly retained, by the tissues. Constructive metabolism is therefore more readily brought about, hence the gain in tone and volume of the muscle tissues. It is suggested that the digestive leucocytosis, evidence of increased functional activity of the leucocyte, means the secretion of a body to combine the nitrogen more readily to the tissues.

Practical Notes.

CHLOROSIS.—For the successful treatment of this condition it is essential to remember that four things are necessary.

(*a.*) The administration of some form of iron in increasing doses, pilula ferri (Blaud's pills) are usually prescribed—these are obviously more efficacious, if freshly prepared. Dr. Osler suggests that one should be given after meals, three times daily, during the first week of treatment; during the second week two three times daily, and during the third week three three times daily. The dose may then be diminished, but the patient should have some medicine containing a salt of iron for three months at least.

(*b.*) Rest in bed in a well-ventilated room or on a couch in fresh air. It should be remembered that in chlorosis the cardiac muscle undergoes fatty changes, and if the heart wall is to recover itself and perform its function normally afterwards, it must have as much rest as possible during the treatment.

(*c.*) A light nutritious diet, which may be easily digested and therefore readily absorbed, must be given ; milk is perhaps the best, but it should be remembered that although milk is as nearly as possible a perfect food, yet it falls short in two ways, firstly it contains too little iron, secondly large quantities must be taken to satisfy the patient.

(*d.*) The bowels must be carefully regulated. There is no doubt that constipation predisposes to chlorosis, and, if it continues, it renders the condition much worse. The late Sir Andrew Clark laid much stress upon the relationship of constipation to chlorosis, and pointed out the importance of administering saline purges. These should be given every morning, or every other morning, and we recommend a mixture containing magnesium sulphate and sodium sulphate.

The following may be used :—

℞. Tincturæ ferri perchloridi - - - ♏ xii.
 Magnesii sulphatis - - - - gr. xx.
 Sodii sulphatis - - - - - gr. xx.
 Glycerini - - - - - ʒ ss.
 Infusi quassiæ - - - - - ad. ʒ i.
M. ft. mist.

Two tablespoonfuls to be taken three times daily after meals.

If, however, gastric symptoms are prominent, the perchloride of iron is liable to increase such ; the scale preparations of iron may therefore be substituted and digestion will be much less disturbed.

The following medicine was recommended by Sir Andrew Clark :—

℞. Ferri sulphatis - - - - gr. iv.
 Sodii bicarbonatis - - - gr. x.
 Sodii sulphatis - - - - ʒ i.
 Tincturæ zingib. - - - - ♏ xx.
 Spiritus chloroformi - - - ♏ viii.
 Infusi quassiæ - - - - ad. ʒ i.
M. ft. mist.

Two tablespoonfuls to be taken twice daily after meals.

FRONTAL HEADACHE.—One of the commonest of slight ailments, met with in general practice, is headache with the pain referred to the forehead. The pain is variously described as being always there or only after prolonged work ; occasionally it is paroxysmal. This referred pain is frequently associated with ocular affections, more especially with errors of refraction such as simple hypermetropia, hypermetropic, or mixed, astigmatism. There is very frequently a difference of refractive power of the two eyes, but this difference is usually slight, and indeed with such symptoms the error of refraction is rarely large. Besides the headache referred to, these patients soon become tired after sewing or reading, and complain that "the words run one into the other," and their eyes look red and irritated, and the margins of the lids are frequently congested

and swollen. After complete rest for a day or two, or a change to the seaside, the symptoms often disappear, only to return on resuming work. The symptoms are reflex, and are caused by over-action of the ciliary muscle, and are comprised under the term asthenopia accommodativa. Such patients often resent any suggestion that their headaches are due to eye troubles, for as a rule their distant vision appears to be excellent, but, as the axis of the eyeball is frequently too short, they have to accommodate for distant objects, and it is consequently over-accommodated for near objects ; hence the strained feeling, tiredness, and headache after reading or sewing for any length of time. It must be remembered, however, that these head-aches sometimes resemble true megrim, or migraine, in which condition there are frequently visual disturbances, while nausea and vomiting are associated with the headache. A tumor cerebri also produces headache, which may be frontal in nature, and it is well in all cases of headache, whether dull, aching, and continuous, or sharp and paroxysmal, whether diffused over the whole head or localised, to examine the optic discs. It is obvious that the treatment for headaches due to eyestrain must be the use of properly adjusted glasses.

DIABETIC COMA.—It is a well-known fact that most young persons of 25 years of age and under, and many persons more advanced in age, who are suffering from diabetes, die eventually of diabetic coma.

The breath of these persons has a peculiar odour, likened to that of apples, and is due to acetone, and they were said to be suffering from acetonæmia. It has been more recently shown that the urine of these patients contains, besides sugar ; acetone, ethyl-diacetic acid, and amido-hydroxybutyric acid ; this latter is probably a product of the decomposition of some of the tissue proteids, the acetone and ethyl-diacetic acid being derived from it. The urine also contains a greater amount of urea than normal, and the ammonium salts are increased. It is found that the blood plasma in these patients contains less alkaline salts and less CO_2 than is normal. These facts, together with the increased output of ammonia in the urine, indicate that an acid is circulating in the blood stream, and that the tissues of the

body attempt to neutralise this poisonous acid which affects the nerve-cells of the cerebral cortex, and produces the coma. When coma is threatening it may sometimes be warded off by the use of aperients, the safest of which is castor oil.

When once coma has appeared, the prognosis is extremely serious, at the same time consciousness may be temporarily restored by the intravenous injections of 30 to 40 ozs. of a ·6 per cent. solution of sodium chloride, or this may be injected into the subcutaneous connective tissue. The effect of this is to dilute the poisonous blood plasma. A 3 per cent. solution of sodium bicarbonate has also been used into the subcutaneous tissues or injected intravenously with a view to neutralising the amido-hydroxybutyric acid. At the same time inhalations of oxygen should be administered.

In order to give this alkaline treatment a fair chance of success, it must be resorted to early, even when the coma is threatening, and fairly large quantities of the salt solutions should be administered. Occasionally recovery has taken place with an increased elimination of amido-hydroxybutyric acid in the urine.

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COXA VARA.—This condition, which was described in 1889, is often spoken of as " incurvation of the neck of the femur," and, as is well known, it occurs at two periods of life— (i) in infants and children about 3 years of age, and at this period is due to rickets ; (ii) in young persons about the age of 14, and is said in such to be due to late rickets, of which disease it is a local manifestation, or it may be due to over-weight or carrying heavy weights, especially in those whose occupation involves prolonged standing and fatigue.

Two important changes take place in the neck of the femur—(1) the angle formed between the neck and shaft of the bone becomes more nearly a right angle, so that the great trochanter becomes elevated and displaced above Nélaton's line ; (2) the neck of the femur also develops an anterior bow, so that the great trochanter is found to be behind its normal position, and the whole limb is rotated outwards so that the toes point externally. The following are the more important physical signs of the disease, and those by which the condition may be recognised. The limb is shortened, sometimes as much

as one and a half inches ; it is externally rotated, abduction and internal rotation are limited. On flexing the thigh on the abdomen, the great trochanter becomes unduly prominent, and the limb adducted; inversion is limited. In walking the patient complains of stiffness and a feeling of fatigue in the affected thigh ; limping also occurs, if both sides are affected, the gait becomes almost a waddle. There is no swelling or tenderness in front of the joint, or thickening of the great trochanter, as occurs in tuberculous disease of the hip-joint, and there is no up-and-down movement on traction of the limb, as occurs in congenital displacement. The treatment in young children consists of rest in bed, which soon relieves the pain, local massage, manipulation and extension of the limb or limbs in the abducted position, with internal rotation. If this treatment fails, sub-trochanteric osteotomy of the femur is recommended, with rectification of the external rotation of the thigh and leg, that is, the splint, which has been applied, and the limb must be rotated inwards. In young adults the neck of the bone is no longer soft, but as a rule completely ossified, and it is obvious, therefore, that but little improvement, if any, will result from manipulation, massage, and extension. Some surgeons, therefore, recommend the excision of a wedge-shaped piece of bone, with the base of the wedge upwards and a little forwards, from the neck of the femur, while others recommend a sub-trochanteric division of the shaft of the femur, with proper rectification of the limb. If the disease is unilateral, a thickened sole must be worn on the boot of the affected side to compensate for the shortening which occurs. At the same time, in both children and young adults, it is well to administer general remedies, such as preparations of iron, phosphates, and cod liver oil. The following may be advantageously given :—

℞ Syrupi Ferri Phosphatis, j.
Olei Morrhuæ, ȝj.
M. f. mist.

For a young adult, two teaspoonfuls to be taken twice daily after meals.

COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the January Competitions will be announced in the March number.

a.—The Subject of the Essay for February will be

The Treatment of Chronic Constipation.

b.—Answers to the following questions are invited :—

1. What are the causes of acute pain in the right iliac region ?

2. What are the various forms of nystagmus and in what circumstances does it occur ?

3. E.T., female, aged 36 years, married five years but has never been pregnant, has had indifferent health for the last three years but no definite illness. There was no history of syphilis. About one year ago, after feeling somewhat seedy for a short period, the patient noticed about the middle of the morning that she was becoming weak in her right hand, arm, and leg; by mid-day the weakness was distinctly more marked. On her husband returning to tea he found her so ill that she lay on a couch unable to move her right arm or leg, her face was somewhat drawn to the left side, and she was unable to speak. The patient experienced great pain in the head, but mainly over the left side, extending chiefly up, over and above the left ear. There was no loss of consciousness, and the patient neither vomited nor felt sick. The patient during the past year has been treated with medicine, and partial recovery has taken place. It is now noticed that the right optic disc is paler than the left and its margins are ill defined, the right pupil is sluggish in reacting to light. At the present time the patient's speech is thick and indistinct, the tongue is fissured though quite normal in its movements, the right arm is flexed, on walking the right leg is drawn after the left, the knee jerks are both increased, but the right one more so, there is right ankle clonus. What lesion would account for these symptoms?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner " Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of March, 1905. No Essay must contain more than two thousand words, and the Editor reserves the right to publish any Essay, which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions, must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of March, 1905.

A and B.—(1) One side of the paper only must be written on.

(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

THE CLINICAL ASPECTS OF PUERPERAL FEVER.

By G. ERNEST HERMAN, M.B. (LOND.), F.R.C.P., F.R.C.S.,

Consulting Obstetric Physician to the London Hospital.

I UNDERSTAND that the task allotted to me is to describe the symptoms, signs, and course of the different diseases commonly included under the term "puerperal fever." Its etiology and prevention are dealt with by others.

Puerperal fever is a disease which results from the inoculation of wounds with pathogenic organisms. These organisms produce different effects in different cases, and the morbid processes begun in wounds spread in different ways. The wounds by which the poison gains entrance may be in the vulva, where they can be easily seen, or in the vagina or cervix uteri, where they are not seen unless a more complete examination has been made than has been usual until quite recent times. I shall describe first the diseases which most obviously affect wounds or spread directly from them.

(1.) "*Puerperal Ulcers.*"—This is the slightest and mildest effect of septic poisoning. It means that the tears of the vaginal orifice which occur in every first labour, and in many not the first, instead of healing as they do when they are kept aseptic, become covered with a greyish-white pellicle ; the tissues around become swollen and red, and there is some febrile disturbance. This was common in lying-in hospitals before the introduction of antiseptics. It was often called "diphtheritic" ulceration, but incorrectly, because in the great majority of cases it has nothing to do with true diphtheria ; that is, the disease produced by Klebs-Lœffler bacillus. But true diphtheria has been seen affecting the vulva of a lying-in woman. If this is suspected, the suspicion should be confirmed or refuted by taking a swab of the discharge and having it examined for the bacillus.

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(2.) *Hospital Gangrene.*—This is a condition which it is to be hoped is now extinct. But it used to be seen in hospitals, and if there should be a place where antiseptics are neglected, may be seen again. In this disease, not only there is the greyish pellicle of necrotic tissue on the surface of the wound and redness around, but the ulcer spreads by slow disintegration of its edges. There is higher fever and greater prostration. The only treatment is to mop every part of the surface freely with a strong caustic, and then to be diligent in the use of antiseptic douches.

(3.) *Spreading Traumatic Gangrene.*—This is a still more formidable condition. It begins with redness and swelling around the wound, with high fever. The redness becomes dusky, then purple, then black, till the tissues are converted into a black, pulpy mass. This process of gangrene spreads rapidly. The decomposition of the gangrenous tissues leads to the evolution of gas, so that there is emphysematous crackling, and when the tissues are cut into gas escapes. The general symptoms are those of septic poisoning, with great prostration. Death rapidly follows. Treatment when the disease has commenced is hopeless. This is rare as a puerperal disease, but the writer has known it occur in a hospital, when a weak antiseptic (to avoid risk of poisoning) was used for a time in place of a strong one.

Similar morbid conditions may doubtless occur in wounds higher up, viz., of the vagina and cervix uteri ; but from the position of the wounds these changes are not detected during life. The inner surface of the uterus has been found covered by what looked like a diphtheritic false membrane : when this has been scraped off the uterine muscle has been seen presenting points of suppuration ; and on section venous and lymphatic channels have been found filled with pus. In some cases the inner part of the uterine wall has been found converted into a greyish-brown sloughing mass.

When morbid changes of this kind take place in the uterus or vagina, the infection generally quickly spreads beyond its point of entrance. The effects produced depend upon the way in which it spreads. The microbes may quickly penetrate through the uterine wall, and produce rapidly fatal peritonitis. Microbes entering by wounds of the vagina or cervix uteri

may get into the pelvic cellular tissue and produce pelvic cellulitis. If the microbes are not very virulent, they may be stopped in the lymphatics, and nothing more than pelvic cellulitis result. This inflammation may end in absorption or may go on to the formation of an abscess. Whether it does so or not probably depends upon the kind of microbe and the dose. If the inflammation is produced by a microbe of somewhat greater virulence, it may spread beyond the broad ligament to the ovary, and an abscess or abscesses of the ovary, together with local peritonitis, may be produced. If of still greater virulence, the microbes may quickly travel through the cellular tissue to the peritoneum. The uterine cavity may be invaded by microbes of much less virulence, as for instance those that feed upon a piece of retained membrane ; and thus only a purulent endometritis be produced. This may extend along the Fallopian tubes to the peritoneum.

The conditions which I have described are local diseases which produce changes in the blood, but the local processes are the conspicuous features of the disease. There are other diseases in which blood poisoning is the main character : either the local changes are such as produce only slight and in-definite physical signs, or the patient dies before there has been time for local physical signs to develop. These, as seen clinically, I now describe.

(4.) *Sapræmia* (σαπρος, putrid), also spoken of as "septic poisoning," or "septic intoxication." This disease is produced by infection of the blood, not with microbes but with toxins produced by microbes. Saprophytes, that is, organisms which feed upon dead tissue, but not upon the living organism, may grow in the lochia, or in a piece of retained membrane. A piece of retained membrane which hangs down through the os into the vagina is almost certain to be attacked by sapro-phytes. The saprophytes produce a chemical poison, the effects of which are proportionate to the dose, and which cease when the poison has been eliminated.

The *symptoms* vary with the amount of the poison that has been introduced, from mere slight fever up to a rapidly fatal illness. The symptoms may begin on the second or third day after delivery, or at any time from this up to the end of the third week. The symptoms are those of fever.

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There may be a rigor and the temperature may quickly rise to 104 or higher. There is loss of appetite, thirst, dry furred tongue, headache, sometimes vomiting, and there may be diarrhœa. There may be delirium, especially at night. There is not usually at first great prostration ; but if the illness goes on unrelieved the pulse becomes rapid and feeble, the skin sallow and slightly jaundiced ; sordes appear about the lips, the patient sinks into stupor followed by coma, ending in death. In fatal cases the disease runs a course of at least some days. The lochia may be so fœtid that the smell is almost unsupportable, both to patient and doctor ; but in some cases there is no great alteration in the smell of the lochia. The discharge may be suppressed, or rather retained. The poisons produced often irritate the parts with which they are in contact, hence putrid matter in the uterus sets up endometritis, which itself augments the amount of secretion, and thus, by furnishing fresh supplies of decomposable matter, aids the continued production of toxins.

The characteristic feature of this disease is the effect of treatment. When the putrid lochia have been washed away, or the bit of decomposing membrane or placenta been removed by suitable forceps or curette, rapid improvement at once follows. A patient in an apparently dangerous condition may be restored to well-being within a few hours.

Saprophytes, as has been stated, are not parasites ; but bacteriologists tell us that there are some saprophytes which are conditional parasites, that is, that when they multiply under favourable conditions, their descendants may become parasites. In this way if sapræmia is left untreated, it is possible that septicæmia, the disease next to be described, may develop out of it.

(5.) *Septicæmia,* or " septic infection," sometimes called " lymphatic septicæmia," is produced by the entrance of virulent micro-organisms into the blood. For the entrance of these organisms the smallest breach of surface is sufficient. Hence this disease has no necessary relation to the extent of the wounds made in parturition, or to the amount of the lochial discharge. The symptoms are those of high fever, with great prostration. There is usually a rigor with rapid rise of temperature and pulse. Slight yellowness of the skin may be

present. There may be mental hebetude, with delirium, deepening into stupor. The pulse, as it quickens, becomes very feeble, and the breathing becomes accelerated. The tongue becomes dry and brown and the lips covered with sordes. The temperature, high at first, may sink and become subnormal as death approaches. Death usually takes place before the end of the third day.

The diagnosis between septicæmia and sapræmia is very difficult, for the following reasons. The conditions which permit or favour the access of parasitic microbes are equally favourable to the access of saprophytes. The early symptoms of sapræmia and septicæmia are the same. Septicæmia may develop out of sapræmia. The only way of distinguishing septicæmia from sapræmia is by the greater prostration that accompanies the former disease. In case of doubt—that is, in a case of high fever post partum, without any physical signs to account for it—the disease should be at once treated as if it were sapræmia : that is, the uterus explored, evacuated, and its cavity washed out with an antiseptic.

(6.) *Pyæmia*, sometimes called "phlebitic septicæmia." This disease results from the entry into the circulation of pus containing microbes. In puerperal pyæmia the usual source of the pus is uterine phlebitis. The disease is characterised by two series of phenomena :—(*a*) Fever, marked by recurrent rigors, with great and increasing depression. The rigors are sudden and severe ; they recur once in forty-eight or twenty-four hours, or even oftener. During the rigor the temperature rapidly rises to a great height, 105° F. or more, and each attack is followed by profuse and exhausting perspiration, during which the temperature falls. The breath has a sweetish odour, which has been compared to that of new-mown hay. The prostration, indicated by increasing muscular weakness, small thready pulse, dry brown tongue, with sordes about the lips, and rapid wasting, increases each day. An icteric tint of skin (hæmatogenous jaundice) and patches of fugitive erythema are often present. (*b*) The formation of secondary abscesses. This commences from the sixth to the tenth day, and is the most characteristic feature of pyæmia. These abscesses are marked by their multiplicity, the rapidity of their formation, and the insidious way in which they come on without being preceded

by any sign of disease in the part. They are most common
in the lungs and liver, but also occur in the spleen, kidneys,
and other parts. Inflammation of the serous membranes is
generally secondary to the formation of abscesses. Peritonitis
is in puerperal women the most common of these inflamma-
tions. In such peritonitis the effusion is usually abundant and
rapidly becomes purulent. Suppurative inflammation of joints
is frequent. The joints, often without pain or other sign of
local mischief, rapidly become filled with yellowish puriform
fluid. Excepting for the effusion they are usually tolerably
healthy, so that if the patient survive the disease, use of the
joint is regained. There may also be diffuse abscesses in the
limbs, either deep down, in or between the muscles, or superficial,
under the skin. Their presence is commonly indicated by
patches of cutaneous redness, and a doughy state of the over-
lying tissues. Suppurative pan-ophthalmitis, dependent on
the lodgment of infective emboli in the vessels of the eye,
is commoner in puerperal pyæmia than in other forms. There
may be retinal hemorrhage without this destructive disease.
Death usually takes place about the tenth or twelfth day,
although some patients linger on for six or seven weeks.
Recovery occasionally occurs.

(7.) *Peritonitis.*—This is one of the commonest forms of
disease included under the term puerperal fever. It may be
a result of direct injury, laceration or perforation, of the
peritoneum ; it may be a result of endometritis, spreading along
the Fallopian tube ; or inflammation may rapidly spread through
the pelvic cellular tissue and the muscular wall of the uterus
to the peritoneum. Peritonitis arising in this latter way was
called by Virchow " *erysipelas malignum internum.*" When
arising in either of these ways it quickly follows delivery and
soon becomes general. The abdomen is swollen, tympanitic,
painful and tender. Respiration is thoracic, the pulse is quick,
small and hard, vomiting becomes incessant, and the vomited
matters green. The face becomes pinched, the nose and
extremities cold. The patient lies on her back, with her
knees drawn up, unable to move. The prostration rapidly
increases and death takes place by asthenia, usually by the
end of the third day.

(8.) *Late Peritonitis.*—Endometritis in the lying-in period—

caused usually by the presence in utero of retained membrane, or by extension of gonorrhœa upward—may extend along the Fallopian tube or tubes to the peritoneum, and cause peritonitis, but this peritonitis may be local only. Pus may be retained either in the tube sealed by adhesions, or in a cavity partly bounded by peritoneal adhesions. An ovarian cyst, generally a dermoid, small before delivery, and situated in the pelvis, may by bruising during delivery be so damaged that it becomes infected with microbes, inflames and suppurates. Inflammation may extend from the tube to the ovary. In these, and possibly in other ways also, a focus of localised suppuration in the pelvis may be formed. Late in the lying-in period rupture of the limiting wall of such a focus may occur, pus may escape into the general peritoneal cavity, and general peritonitis may be the result. This may occur towards the end of the first, in the second or third week, or even later. The longer a focus of pus remains confined to a limited area, the less likely is it to escape, because fibrous tissue becomes more and more firmly organised around it.

In such cases there is pain and tenderness, but limited to the neighbourhood of the local inflammation. There is fever and the patient is weak, but there is nothing like the prostration which accompanies general peritonitis. If the patient is examined early in the case, ill-defined resistance will be felt on one or both sides of the uterus and behind ; but there will be too much tenderness for it to be possible to define the swelling bimanually. The longer the case goes on, the easier will it be to examine the patient, and the more definite and distinct the swelling will be. Its situation will depend upon its origin and seat. If the inflammation began early in the lying-in, and the pus is in the tubes, the swelling will be high up and lateral. If the pus is encysted in the pelvic peritoneum, it will be in Douglas's pouch, which it will bulge downwards and forwards. If it is a suppurated ovary, or a tube which had not become inflamed till after the uterus in process of involution had sunk into the true pelvis, it will be in one or both posterior quarters of the pelvis.

These are the cases that can often be saved by prompt surgical intervention ; by opening a localised abscess bulging in Douglas's pouch ; by removing suppurated tubes, or ovaries ;

or even, as has been successfully done, by cutting out and removing an abscess in the uterus.

(9.) *Pelvic Cellulitis.*—I have already described how patho-genic microbes may cause inflammation of cellular tissue rapidly spreading to the peritoneum, and thus cause death by peritonitis. In these cases the patient dies before the inflam-mation of the cellular tissue has had time to produce physical signs; and the existence of pelvic cellulitis is not found out unless a post-mortem examination is made.

There are cases in which inflammation of cellular tissue is not so acute as to at once involve the peritoneum, but never-theless quickly extends and proves fatal within a week or two. The symptoms may immediately follow delivery, or it may not appear that there is much wrong during the first few days. The disease sometimes begins with a rigor, but whether this is so or not, there is fever and pelvic pain. Then there is swelling beginning in the broad ligaments and quickly rising into the inguinal regions. It is generally more on one side than on the other. It may spread down the thighs, or up to the kidney, or back through the sacro-sciatic notch. The swelling is never very firm, because the patient dies before the effused lymph has had time to get organised. As the swelling extends fever continues, and the patient gets more and more prostrate till death follows, usually within a fortnight. This form of pelvic cellulitis is rare.

The common form of pelvic cellulitis is a much more chronic disease, which seldom if ever proves fatal when properly treated. It may begin immediately after delivery; its symptoms are generally manifest within the first week; but they may first be noticed at any time up to the seventh week. When it seems to begin so late, the probability is that the patient had begun to be ill at an earlier date, but her medical attendant had not noticed it. A common history is that the patient began to get up at the usual time after delivery, but found herself so ill that she had to go to bed again. In about one fourth of the cases it begins with a rigor; this is more frequent in the cases that begin early. Pain is almost invariably present. There is weakness, and there is fever; but except in the first few days the temperature is not commonly higher than 103° F. Before there has been time

for coagulable lymph to be thrown out, there are no physical signs ; but when lymph has been effused, it forms a swelling that can be felt. It is usually on one side, the left more often than the right, but may be bilateral. It is at first in the broad ligament, but soon rises up into the inguinal region, between the peritoneum and the transversalis fascia. There it forms a swelling, the long axis of which is parallel with Poupart's ligament. The morbid process then takes one of two courses, (*a*) absorption, (*b*) suppuration. The later the disease appears (which probably means the later it is discovered), the more frequent is suppuration. If (*a*) absorption takes place, the fever subsides, the pain becomes less, and the swelling diminishes and disappears. The usual duration of the illness is about a month. If (*b*) suppuration takes place, fever continues, and is rather higher than in the cases which end in absorption. The inguinal swelling increases, bulges, and points. At this period the illness should be shortened by opening the abscess. The usual duration of the illness when suppuration takes place is about three months. In about one case in ten the abscess extends between the psoas muscle and the pelvic brim. Then the thigh becomes bent up at a right angle to the pelvis and fixed. The patient will be unable to extend it until the pus has been let out. The duration of the illness in such cases is somewhat longer : four or five months.

The above described is the common form of puerperal pelvic cellulitis. There are rare and exceptional forms ; but space forbids the description of every possible peculiarity.

There are other causes of fever in the puerperal state, to which the term "puerperal fever" is not applicable, but which may for a little while cause anxiety lest that disease should be imminent. Emotion may send up the temperature. The characteristic feature of elevation of temperature from this cause is its very transitory existence. The temperature may run up to 105, and down again within a few hours. Slight elevations of temperature are often caused by disturbances of the bowels—constipation, flatulence, or diarrhœa—or the breasts—fulness, sore nipples,—or both bowels and breasts. It is probable that these conditions, in sending up temperature, act largely through emotion.

THE TREATMENT OF PUERPERAL FEVER.

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IN the treatment of puerperal fever, the first question to be considered is that of local disinfection. To be of avail, this should be undertaken at the earliest possible moment, before, in the case of sapræmia, too large a dose of toxin has been absorbed, or, in the case of septicæmia, septic microbes have spread too widely in the tissues for the natural powers of resistance to overcome them, provided that no more gain access. It is of the utmost importance, therefore, at the first onset of symptoms not only to take the greatest pains to make a diagnosis, but to assume that any pyrexia or other suspicious symptom is probably due to some form of septic absorption, unless it is quite adequately accounted for by some other cause.

The first step should therefore be a careful examination of the genital canal, commencing with the vulva and vagina, and the condition of any lacerations or abrasions should be specially noted. If a stitched perineum is suppurating and not uniting, the stitches should be removed to allow free drainage. On the other hand, if there is a perineal laceration unstitched, the surface of which is not too unhealthy, and a septic discharge from the uterus is passing over it, it is sometimes advisable, even after the lapse of several days from delivery, to unite it by sutures, after previously scraping the surface with a curette.

Local Disinfection.—In general, if any lacerations or raw surfaces appear inflamed, sloughy, or unhealthy, they should be mopped with a strong antiseptic such as a solution of mercuric iodide in alcohol, 1 in 250, tincture of iodine, or pure carbolic acid. In some cases such lacerations or abrasions appear to be covered with a false membrane. This generally means a virulent streptococcic infection, and used to be found most frequently in epidemics of puerperal fever such as occurred in lying-in hospitals before the modern development of antiseptic midwifery. Such membranes should be touched with a more caustic solution, sufficient to cause a superficial

slough, such as a solution of chloride of zinc, gr. 300 ad ℥i, after local application of cocain, or under a general anæsthetic. The microbic contents of the membrane should also be investigated by culture, since true diphtheria may affect the genital canal.

In the majority of cases the site of absorption is the placental site rather than the vulva, vagina, or even the cervix uteri. The next step should, therefore, be to obtain a specimen of secretion from the cavity of the uterus for microscopic examination and culture. The cervix should be exposed by a Sim's speculum, seized and brought into view, if necessary, by a vulsellum, and wiped clean with a sterilised mop. The condition of any lacerations in its margin is thus observed.

The best form of instrument for obtaining secretion appears to be that employed at Queen Charlotte's Hospital, consisting of a double sterilised tube. The outer and larger tube is closed at the end by a thin india-rubber diaphragm. When this end has been passed within the cervix, the inner and thinner tube is pushed through it, so that it takes up a drop or two of secretion from the interior of the uterus, and is then withdrawn again, so that it is protected from contamination from the vagina or vulva, as the whole instrument is taken out. Another instrument for the purpose is Döderlein's tube, kept in a sterilised container. Being removed from the container, it is passed as far as possible into the uterus, care being taken not to touch with it the external genitals, or the outside of the cervix uteri. To the end projecting from the vulva a syringe is attached by means of a piece of rubber tubing. When suction is made some of the uterine secretion is drawn up into the tube, which is then removed from the uterus, and replaced in its container, when the ends have been closed with sealing-wax. In the laboratory it is broken in the middle and cultures made from the contents. In the absence of these instruments a specimen may be obtained by a sterilised swab, such as is used for obtaining secretion from the throat in suspected diphtheria, care being taken to pass it well within the open cervix without touching any other part.

The result is of great importance for prognosis, and has a bearing also upon treatment. If saprophytic microbes only

are found, the case is probably one of sapræmia only; or, at any rate, the microbes are not likely to have penetrated farther than necrotic tissue. The prognosis is very favourable, and a cure is likely to be effected by evacuation of the uterus. Repeated washing out of its cavity may be called for. If septic microbes are present, the case is likely to be septicæmia; and, if there are streptococci, the tissues will probably be more deeply affected, and the prognosis is graver. If the lochial discharge, as it comes from the uterus, is offensive, the affection is likely to be due to saprophytes. In virulent forms of septic infection the discharge may be quite free from smell. In such cases repeated irrigation of the uterus is rarely useful.

The next step is to decide whether at once to explore the cavity of the uterus. In determining this, attention should be paid to a constant sign of commencing septic endometritis, namely, an arrest or deficiency in the normal involution of the uterus. This will be the more easy to determine if a record has been kept twice a day or once a day at least, on the temperature chart or otherwise, of the height of the top of the fundus above the symphysis pubis. Regard should also be paid to the history of the case, whether there has been any difficulty about the expulsion of the placenta, and whether placenta and membranes have been verified as complete.

In cases of only moderate pyrexia, where the temperature does not exceed 102° F., and where there is no reason to suspect any adhesion or partial retention of placenta or membranes, it may be sufficient in the first instance to wash out the uterus. The best tube for the purpose is Budin's tube, the transverse section of which is in the form of a horseshoe, so that there is a deep groove on the outside of the tube providing for the return current, and not liable to be blocked by a clot or shred. These tubes are made in glass, celluloid, or metal, of which the metal is the best, since it has the deepest groove in proportion to its size, and is most readily sterilised by boiling. For the uterine douche, it appears better not to use mercury, since poisonous effects have sometimes followed its absorption. Chinosol ¼ per cent., tinct. iodi. 1 per cent., or lysol or cyllin 1 per cent., in boiled water, answer the purpose. Although it is now generally considered preferable to use no vaginal douches during the puerperium in normal

cases, yet, when symptoms of sepsis have appeared, they should be used and continued regularly, especially if any lacerations are present at the vulva. For the vagina perchloride of mercury may generally be used safely twice a day, provided that the patient is in the dorsal position, and that care is taken that no excess is left in the canal. The strength may be 1 in 3,000 for two or three days, later 1 in 4,000. It should be avoided in cases of renal disease, or if there is any diarrhœa, and, if diarrhœa or tenderness of gums appear under its use, it should be changed at once to one of the antiseptics mentioned above. These may be used at shorter intervals. There is ground for believing that mercury has a special efficacy as compared with other antiseptics, since the early triumphs of antiseptics in lying-in hospitals were obtained by the substitution of perchloride of mercury for Condy's fluid and carbolic acid, not only as a disinfectant for hands, but as a routine vaginal douche during the puerperium.[1]

If the bowels have not been well evacuated when pyrexia first appears, it is well to give a dose of three or four grains of calomel, followed by sulphate of soda after a few hours. The pyrexia may be dispelled by the clearing out of a fæcal accumulation, and these drugs have some influence as intestinal antiseptics. For the same reason, there is some advantage in using sulphates, if laxatives are required later. If mercurial douches are being used, it is important to secure a daily action of the bowels.

Exploration of the uterine cavity should not be farther delayed if pyrexia is not abated after these measures in the course of twelve hours or so. It should be carried out at once, if the first onset of pyrexia is very severe, temperature rising to 103° or 104°, if there has been any adherent placenta, or if there is reason to suspect that a portion of placenta or membranes has been left within the uterus. An anesthetic is given, and the uterine cavity explored with the index finger completely to the summit. This exploration should not be omitted, even if it is considered certain that placenta and membranes have come away complete. For mistakes are sometimes made in this, and moreover there may be a septic clot adherent to the placental site, or sloughy fragments of decidua attached to the uterine wall, the result of the action of saprophytic microbes.

According to my experience, this early exploration of the uterus is the measure for the treatment of puerperal fever which is most often omitted in private practice, or postponed until it is too late to be of service. It is not adequately replaced by repeated irrigation of the uterus, since this does not secure the evacuation of adherent shreds which may be furnishing a nidus for microbes. I would suggest that it is in this respect that the ordinary treatment is most capable of improvement.

By some, especially by French and by some American authorities, not merely evacuation by the finger, but curretting of the uterus has been extensively practised. The object is not merely to break down adherent placenta, but to remove the whole of the endometrium in which microbes are spreading. It appears, however, a very remote chance that this can be successfully accomplished, especially when the microbes are streptococci, which spread deeply in the tissues. On the other hand, the traumatic effect is apt to be injurious, and the barrier of leucocytes which may have been established against the invading microbes is apt to be broken down, without removal of the whole of the infected tissue. The general opinion, therefore, is that curetting as a routine measure increases rather than diminishes the mortality.

The curette may be used for a different purpose, namely, to break down and remove adherent placenta. In general, however, the finger is the safest and most efficient instrument for this end. As a preliminary step, first the vagina and then the uterus are washed out with either an antiseptic lotion or normal saline solution. Then any adherent placenta or rough shreds of decidua are gradually broken down and separated by the pulp of the finger. Finally, the uterine cavity is again washed out with one of the antiseptics mentioned at page 300. It is only in very rare cases of firmly adherent placental relics that the curette may be required for their separation. If a curette is used, the best form is a flushing curette of large size with a blunt edge. By means of this shreds are washed away as they are detached.

If there is considerable bleeding from the evacuation, the uterine cavity may be plugged for 24 hours with sterile moist iodoform gauze, 10 per cent. Otherwise an iodoform rod may

be left in the uterine cavity,* and a similar one passed up through the cervix on succeeding days.

It is generally in cases of infection of the uterine cavity by saprophytic microbes that the surface is found to be roughened by shreddy and necrotic fragments, and the discharge offensive. In streptococcic infection the surface may be found smooth, and the placental site normal to the touch. No repeated irrigation of the uterus is then advisable, in the absence of an offensive discharge. The case may be compared to that in which streptococci gain access to a surgeon's finger by a minute crack, and infection spreads from the finger to the hand and arm. No treatment to the site of infection can be of any use. On the other hand, in sapræmic and mixed cases, the uterine irrigation may be repeated daily with advantage, so long as the discharge is offensive, or shreds are washed away, and the cervix remains patent.

Diet.—It is of the first importance to maintain the strength by abundance of liquid nourishment given at short intervals, not more than two hours, except during sleep. The amount of water taken is of value in promoting the action of the kidneys and thus eliminating some of the toxin. The chief reliance should be placed upon milk, very fresh and unsterilised if possible, in varied combination with such things as Benger's or Neave's food, or Horlick's malted food, or in the form of junket, or simply diluted with barley water. A fair amount of alcohol should be taken in the form of brandy or champagne. In very severe cases, with a rapid feeble pulse, advantage has been found in increasing the brandy up to 10 or 12 ounces in the 24 hours. It is best given at short intervals, and may be diluted and beaten up with egg. Meat jelly and meat extracts may be given if milk is not taken well, but should be avoided if diarrhœa is troublesome.

In some severe forms of septicæmia much advantage has been derived from injections of sterilised normal saline solution (sodii chlorid. gr. lx ad oj) into the cellular tissue in quantities of a pint or more at a time. An aspirator needle united to a funnel by an india-rubber tube 4 or 5 feet long may be used for the purpose. The site chosen is one where cellular tissue is loose and abundant, as around the breasts ; and the fluid as it flows in is diffused by massage. This measure is not

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* ℞. Iodoform gr. 120, acaciæ gummi, amyli, glycerini, aa. gr. x.

generally called for if a patient is able to drink and retain large quantities of liquid. It may be replaced by rectal injections of similar quantities of normal saline solution when the rectum will retain them. It is specially indicated in cases where vomiting is associated with diarrhœa or an irritable condition of bowel.

Antipyretic and Medicinal Treatment.—The effect of drugs is of less importance than the maintenance of the strength by food ; and, therefore, no drug should be persevered with which causes vomiting or nausea, or even interferes with relish for food. For the treatment of very high temperatures the direct application of cold is the most effective measure. This can be carried out with the least disturbance or inconvenience to the patient by means of an ice-water cap to the head. Either Thornton's cap of india-rubber may be used, or a Leiter's coil of metal tubing ; or a Leiter's coil may be placed over the lower abdomen, if the uterus is tender, painful, and much deficient in involution. Cooling may also be effected by tepid sponging to the trunk, or wet packs renewed at intervals. The effect of cool baths at 85°–80° F. has been highly praised,[2] but they are not advisable when there is much pain, tenderness, or vomiting. A very high temperature with tendency to coma or delirium is the chief indication for them.

Among medicinal antipyretics quinine in full doses is the most valuable. Five grains every four hours may be given in a mucilaginous mixture with bicarbonate of soda, and continued until there are signs of cinchonism, if the drug does not interfere with the taking of food. Warburg's tincture, which contains quinine with aloes and various aromatics, has a repute for desperate adynamic conditions. It is given in two or more successive doses of half an ounce at two or three hours' interval; but is not suitable for prolonged use.

Another favourite and valuable remedy for septicæmia is tincture of perchloride of iron in rather large doses, such as 20 minims every three hours. This may be given when the temperature is not extreme, or when quinine is not well tolerated. It is specially useful in septic diarrhœa, in which case it may act as an intestinal antiseptic.

Other antipyretics are generally to be avoided on account of their depressing effect; but phenacetin may be useful for relief of pain. Strychnia is valuable when there is a very

rapid and failing pulse. Opium and morphia have been given in large doses for septic peritonitis. The modern tendency is to limit their use as much as possible, especially if there is a tendency to intestinal paralysis. Other hypnotics should be preferred as a rule; but, if pain from localised peritonitis prevents sleep, morphia with atropia may be given hypodermically. In generally diffused septic peritonitis, with increasing distension of abdomen, morphia may procure euthanasia but not cure. If there is any hope, it lies rather in giving subcutaneously strychnia with atropia, combined with turpentine enemata.

Antistreptococcic Serum.—The use of antistreptococcic serum is not yet finally accepted as having passed beyond the experimental stage. In 1899 a committee of the American Gynæcological Society for considering the value of Marmorek's serum condemned it as useless in puerperal fever, though the committee considered that it might be used without injurious effects. Individual reports, however, have given a more favourable view. It appears that different cultures of streptococci vary considerably, and that serum derived from one variety is not antagonistic to others. Efforts have, therefore, been made to obtain a polyvalent serum by treating horses by successive cultures derived from different sources. It is probable that more may be yet attained in this direction if cultures are obtained from actual puerperal septicæmia, or from erysipelas, which appears to have a closer affinity to fatal puerperal septicæmia than have other forms of surgical septicæmia and pyæmia.[8]

Antistreptococcic serum, unlike antidiphtheritic, is supposed to have a bactericidal action, not one of neutralising the toxin. It cannot, therefore, be expected to be effective when streptococci are multiplying in an effusion outside the tissues, as in the peritoneal cavity; and is more likely to be of service if used early, before the microbes have multiplied largely. My own experience leads me to think it a remedy of value, although by no means equal in its effects to antidiphtheritic serum. It may be used at the outset, if symptoms are severe, since, in the great majority of fatal cases of puerperal fever, streptococci are found either alone or combined with other microbes. Its continuance should depend on the result of bacteriological investigation. As much as 20 cc. should be given at first; not less than 20 cc. daily; and the remedy

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should be continued, if the patient is holding her ground, till definite improvement appears. I have known unexpected recovery to take place in very severe septicæmia after doses of as much as 40–60 cc. a day for several days. I have not found unfavourable symptoms from the serum supplied by the Institute of Preventive Medicine, beyond some redness and swelling at the site of punctures, and sometimes a very irritating rash, after a few days. After the use of some varieties of serum rise of temperature, severe rheumatoid pains, or attacks of diarrhœa have been observed.

Other means which have been tried for stimulating the resisting powers of the organism are in the experimental stage. One is the administration of nuclein, derived from yeast. It is believed to have an action upon the bone marrow, and so to be a stimulant to leucocytosis, and is also stated to have itself germicidal properties. Solutions are prepared by Messrs. Parke, Davis & Co. for hypodermic use, and also for taking by mouth. Favourable reports have been given of the effects of the silver preparation, Credé's collargol. It has been used generally in the form a 15 per cent. ointment, rubbed daily into the skin, and a half per cent. solution has also been injected into a vein in daily doses of 10 cc.

Operative Treatment.—In the more chronic forms of septi-cæmia or pyæmia which lead to the formation of local abscesses, the indication is absolute, as soon as the locality of the abscess is discovered, to open it if possible. A free opening is made, the cavity washed out, and a large drainage tube inserted.

Perametric abscesses most frequently point in the groin above Poupart's ligament. Perimetric abscesses may point on the surface of the abdomen, but frequently open into the bowels, sometimes into the bladder. If they are detected in the pelvis it is advisable to open them from the vagina before they reach any other cavity. To minimise the risk of hæmorrhage, the best way of opening, either from the surface of the abdomen or from the vagina, is Hilton's method. A superficial incision is made through skin or mucous membrane, and a director or sinus forceps is pushed on until the pus is reached. The opening is then dilated by the blades of the forceps till the finger can be passed in. If, however, there is any possibility of free peritoneum intervening in front of the

abscess, a careful dissection should be made down to its cavity with the scalpel. In the case of opening from the vagina, the best form of drainage tube is Herbert Spencer's, which has a double flange of india-rubber at the top to retain it in place, and is lined in its upper part by a glass tube to prevent its collapse.

Of late attempts have been made, more widely on the Continent and in America than in this country, to deal with puerperal septicæmia by operation in the more acute and early stage. Since the uterus is generally the primary seat of absorption, and microbes are spreading for some time in its walls before they extend to other parts, treatment by hysterectomy appears to be logical, while, if any peritonitis exists, the removal of the uterus allows very free drainage through the pelvis, in accordance with gravity. The objection to the operation lies in the fact that if it is performed only when it becomes evident that the patient will otherwise die, the septic process will have extended beyond the uterus, and the operation is likely to be too late, while her condition will be such that she may not survive the operation. If on the other hand hysterectomy were performed in all cases of streptococcic endometritis or metritis, many patients would be mutilated who would otherwise have recovered without mutilation, and it is doubtful whether the mortality would not be increased rather than reduced. Thus Whitridge Williams[4] reports 52 cases of streptococcic endometritis, verified by bacteriology, treated with only 2 deaths, less than 4 per cent. The general mortality, however, in cases of serious pyrexia is not so low, and it may be presumed that these were cases of infection occurring in spite of antiseptic precautions which excluded the most virulent forms of conveyed contagion. In 354 cases of puerperal pyrexia reported to the Collective Investigation Committee of the British Medical Association (1884), the mortality was 47·4 per cent. In 24 out of these, ascribed to contagion from other cases of puerperal septicæmia, the mortality was 70·8 per cent., and in 17 ascribed to contagion from erysipelas 70·6 per cent. This was not a mortality due to injudicious curetting, but mild cases would naturally not be reported.

Hysterectomy for sepsis in the puerperal state has so far proved a very dangerous operation. Thus in 112 cases collected by Jewett,[5] including operations after abortion, the mortality

was 48 per cent., in 34 operations after full-term labour 50 per cent. These were not all cases undertaken as a last resort, for in 25 the sepsis was found limited to the uterus, and in these the mortality was 24 per cent. In 12 cases there were more or less peritonitis, and the mortality of these was 83·4 per cent., while there was no recovery where general diffuse peritonitis existed.

The conclusion is that hysterectomy has for the present a very limited field in the treatment of puerperal fever. It may be advisable in some exceptional cases, such as a septic and sloughing myoma, abscesses in the uterine wall, a condition difficult to diagnosis; possibly also where there is placental tissue so firmly adherent that it cannot otherwise be removed; or where the septicæmia has shown itself to be of a virulent kind, or is presumed to be so from the source of the contagion, and where symptoms of peritonitis are just commencing, especially if a week has elapsed since delivery. If the operation is undertaken within the first few days after delivery, while the uterus is still very large, the abdominal method seems to be best, since difficulty has been found in vaginal hysterectomy on account of the friability of tissue or in the arrest of hæmorrhage. Otherwise vaginal hysterectomy by the clamp method has the advantage that no ligatures are left to become septic, and that the cellular tissue has free drainage when the clamps are removed. The peritoneum should be left freely open, the vagina being loosely plugged with iodoform gauze.

Abdominal section may be undertaken with a much better hope when there is reason to diagnose a pyosalpinx on account of localised symptoms and a lump in the position of the uterine appendages. The prognosis is still more hopeful if the infection is gonorrhœal rather than streptococcic. If it is streptococcic, and there is evidence that the pyosalpinx is adherent, it involves less risk to evacuate the pus from the vagina when this is practicable, since the pus is likely to show itself virulent if it contaminates the general peritoneum.

In general diffuse peritonitis, abdominal section affords such a forlorn hope that it can scarcely be urged, though the prognosis may be quite hopeless without it. If the abdomen is opened, and such a condition is found, the best chance is to wash out with normal saline solution, empty the intestines by

an incision if they are much distended, and place drains of iodoform gauze or large tubes in the pelvis and lumbar fossæ. The condition of the patient will rarely allow hysterectomy, but a drain may be passed from the pouch of Douglas to the vagina.

At the outset of commencing peritonitis, a less severe operation may be performed, namely, to evacuate the uterus, open the pouch of Douglas from the vagina, and pack both uterine cavity and pouch of Douglas with iodoform gauze. Pryor[6] records that out of 37 cases treated in this manner, there were 27 which had not previously been curetted, and that in these there was only one death. These operations, however, were performed, not on account of evidence of peritonitis, but at the outset of sepsis, and the uterus was curetted at the time. The peritoneal fluid was generally found only serous, but contained streptococci.

There is yet a later stage at which a question of operation may be raised, namely, where there is evidence of thrombotic septicæmia, generally tending to fatal visceral pyæmia, in the shape of repeated rigors and a widely oscillating temperature, rising to high levels. It has been proposed either to remove with the uterus, or simply ligature, the uterine and ovarian veins in which the thrombosis exists. A successful operation of ligature only by Trendelenburg[7] has been recorded. Necropsies of fatal cases, however, show that, in the great majority of cases, thrombosis extends beyond the veins which could be ligatured or removed. Such an operation could therefore only be regarded as affording a forlorn hope in a case which may otherwise appear hopeless.

REFERENCES.

[1] Boxall : " Fever in Childbed," *Obstet. Trans.*, Vol. XXXII., 1890.

[2] Runge : Volkmann's *Sammlung*, No. 287.

[3] " The Annual Variation of Puerperal Fever compared with that of some Allied Diseases," *Trans. Hunterian Soc.*, 1903.

[4] Whitridge Williams : *Obstetrics*, p. 788.

[5] Jewett : *American Gynæcology*, February, 1903.

[6] Pryor : *New York Med. Journ.*, August 23, 1903.

[7] *Report of Internat. Congr. of Obst. and Gyn.*, Rome, 1902 ; *Monatschr. f. Geb. und Gynæc.*, Bd. XVI.

THE PREVENTION OF PUERPERAL SEPTICÆMIA.

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THE question of the best means of preventing Puerperal Septicæmia still requires elucidation. Semmelweis, Pasteur, Lister each initiated a great stage towards success, and the details have been and are still being worked out by many observers. Fifty years ago, Semmelweis urged that the mischief was due to the unpurified examining " touch," the inoculation of dead or decaying substances or of wound discharges, and this, although it seems simple and elementary to us in our present state of knowledge, was probably the greatest single advance made in this subject. Many observers after Semmelweis had recorded the occurrence of micro-organisms in the tissues of patients succumbing to puerperal septicæmia, but Pasteur cultivated during life a pyogenic organism from the blood in such, and subsequent investigations by others have confirmed and extended these observations and shown that various micro-organisms may be causal. Lister's antiseptic system, and the method of ensuring asepsis developed from it, have been as far as possible utilised by the obstetrician, and thus on the work of these three great investigators the means of preventing puerperal septicæmia have gradually developed.

The question now before us, therefore, is how the practitioner is to conduct a labour case so as to minimise the chance of septic infection, and we can thus profitably discuss—

1. *The Origin and Nature of Puerperal Septicæmia.*
2. *The best and simplest means of preventing Puerperal Septicæmia.*
3. *Special points as to the risk of conveying Sepsis from one case to another.*

(1.) *The Origin and Nature of Puerperal Septicæmia.*[1]

We must first here state a negative. Puerperal septicæmia does not originate *de novo* in the lying-in woman, *i.e.*, is not

[1] By puerperal septicæmia we mean a general infection by a pathogenic organism; for the more local mischief we may use " puerperal infection," while sapræmia is generally held to embrace cases of intoxication with the products of micro-organisms without actual tissue invasion by these.

autogenetic but heterogenetic—introduced from without. There are no pathogenic organisms in the woman's tissues to be developed in the puerperium, nor are they found in the healthy genital tract above the level of the hymen and external genitals. This last exception is one of great importance as we shall presently see. Our present standpoint is therefore that in puerperal septicæmia we have an invasion *viâ* the lymphatics, in pyæmia *viâ* the blood, of the woman's tissues by some form of micro-organism, and that these have either been primarily on the examining fingers of the attendant, or conveyed from the patient's uncleansed external parts, deeper into the genital tract during examination. They are thus deposited on lacerated or raw surfaces, *e.g.*, on the torn cervix or uterine interior bare from the separation of placenta and membranes, or on retained placental tissue, and may thence develop through the patient's system.

We need not for a practical paper give any bacteriological detail as to these micro-organisms, but briefly state that pyogenic organisms (streptococci and staphylococci), the colon bacillus, and the rarer B. diphtheriæ, B. typhosus, and gas bacilli are the main forms, but the latter three are exceptional.

We must not, however, be carried away by this and suppose that all cases of infection are due to the attendant. The patient herself and the husband have also responsibility. Thus the woman may have some tubal condition (pyosalpinx) persisting, and the rare cases where an infant has developed gonorrhœal ophthalmia although delivered by Cæsarean section, as well as the common cases where the infection is conveyed to the eye in the passages, show that there may be sources of special infection independent of the attendant which may give rise to serious mischief in the puerperium. The personal habits and cleanliness of the patient are of some importance, so that while we admit broadly the attendant's responsibility, we do so with the exceptions just indicated.

The practitioner has, therefore, to make up his mind to this, that the lying-in woman has to be placed in the best possible surroundings. All care must be taken that no septic or putrefactive organisms are introduced by the necessary labour-examination. The labour is to be so conducted that

no undue tearing is allowed, and, above a'l, the placenta and membranes must be so expelled that they come away intact and at the proper plane of separation. If pieces of membrane or placenta are left behind, they become a medium for the growth and spread of micro-organisms. These break up the tissues so left into its primitive elements, and by the toxins they manufacture and their actual invasion of tissue produce septic infection. This is the essential nature of puerperal septicæmia— a micro-organismal invasion from without, starting from lacerated surfaces or on tissue débris and spreading through the patient's system.

We must now, therefore, consider—

(2) *The best and simplest means of preventing Puerperal Septicæmia.*—The general hvgiene of the patient must not be neglected, and the practitioner should give her advice as to how she is to guide herself during her pregnancy. Of course one knows that in the majority of cases the medical man has little chance of this, and, for instance, in large colliery or club practice he may not be summoned to the patient till labour or some catastrophe of labour calls him. Nevertheless, he should have an ideal in this matter, and, when he can, give his patient advice as to diet, regulation of bowels, and outdoor exercise. He should, above all things, get information as to the state of the urine : its amount, specific gravity, and the presence or absence of albumen and sugar. If a practice be regulated on these lines the patients will become educated to expect this care, and the doctor will reap his reward in the reduction, for instance, in the number of cases of the catastrophe of eclampsia, and in the special general fitness of the woman herself for the strain and risks of labour. The patient's surroundings are, of course, to a certain extent, beyond the medical man's power, but the importance of fresh air can be insisted on, and, even in apparently unfavourable surroundings, the results may be as good or even better than in the most up-to-date hospital. The analogy of milk souring may help. There is more risk of milk souring in a well-attended-to dairy, it is said, than in the ordinary house, or even in the house with unfavourable conditions as to cleanliness. The reason probably is that the bacterium causing the souring is more abundant in the dairy than in the private house.

Conduct of Labour.—When summoned to an obstetric case the medical man begins his struggle with infection on laying hold of his obstetric bag.

The modern idea is that he should go to his case with his sterilised instruments, &c. in a bag so constructed that it can also be sterilised. Thus Edgar and Ballantyne have worked out the construction of a bag so that it consists of two metal trays in a canvas case, and these can contain bottles, instruments, sterilised coat, gloves and towels, and can act during the labour as trays for washing the obstetrician's hands, or for use as baths for resuscitation of the child if asphyxiated. Everything can be prepared for a case beforehand, and in this way time and trouble saved, to say nothing, of course, of the patient's advantage. The idea is very good, but probably may demand too much time for the busy practitioner. No one can, however, neglect the principles on which all this is based, and therefore every obstetric bag should have a removable sterilisable lining, should be occasionally cleared out and cleansed, and instruments, of course, should be all metal and boiled in soda solution prior to use. Clean towels should be provided by the patient, and with these the parts of the lying-in woman can be protected. In lieu of a sterilised coat, the medical man can, with them, improvise a guard to his own clothing and a protection against infection, while they can be placed below the patient if the sanitary sheet is not used to catch discharge. In this way the same end can be attained as with a more expensive outfit. The patient's labour should, when possible, take place in a well-lit and well-ventilated room, and the drainage arrangements should be satisfactory.

When labour is about to start, the patient should have a bath and the external parts should be cleansed with mild carbolic soap after the bowels have been thoroughly attended to, if necessary. It has been urged that the patient should rather have the water poured over her than be immersed in it, but if the water is changed after the first ablution, there is no risk of the first impurities removed doing harm. It is easy, however, for the nurse to cleanse the patient with running water, and thus get over the difficulty simply.

The woman then puts on her clean linen, and lies down on clean sheets, towels or pad, for examination. The method

of preparing the bed is too well known to need special description.

The *method of examination* is of high importance and may be done (*a*) with the sterilised bare hand, or (*b*) after the hands have been thoroughly cleansed, boiled india-rubber gloves may be worn.

(*a.*) With the sterilised bare hand.—It has now been shown that even with the most elaborate precautions, it is doubtful if the hands can be made "sterile" in a bacteriological sense. They can, however, be made practically pure for obstetric purposes. They must, therefore, be thoroughly washed with hot water and a non-irritating soap, and then well brushed with a boiled brush and such an antiseptic as lysol (1—100), corrosive sublimate (1-2000), carbolic lotion (1-40). It is not good to use too strong antiseptic lotions as they defeat the aim of disinfection by so roughening the hands as to make them more liable to carry infection. They also injure the nail matrix as all of us know too well. The careful disinfection of the hands and nail furrows is a matter of time (10-15 minutes), and may be carried out in an adjoining room if there is any risk of the patient's misunderstanding the precautions.

For special use after suspicious or septic contact, one may soak the hands in saturated solution of permanganate of potash, discharge the colour with saturated oxalic acid, finally washing off the acid with sterilised water or precipitating it with sterilised lime water.

(*b.*) With india-rubber gloves.—The hands are sterilised as before, and then the gloves, previously boiled in simple water in a folded towel, are filled with boiled water and slipped on. There is no doubt that the difficulty of hand-contamination is in this way got over, but they do interfere with touch at first.

The method of conducting the first examination is of the greatest importance. It should be as thorough as possible. One's aim should be to make it the only one during labour. This, of course, is in many cases not feasible, but it should be a cardinal rule to examine as seldom as possible. How one can dispense with internal examination will be discussed afterwards. The patient will lie in the obstetric position usual in this country, although the dorsal one has advantages. The parts have been cleaned already, but if necessary the nurse,

who follows all the precautions adopted by the doctor, does so again, using fresh cotton-wool and lysol.

Without offending the patient's feelings, the vulva should be exposed, and the fingers of the left hand separating the labia minora, the examining fingers of the right, moist with lysol and soap, are passed directly into the vaginal entrance without previously touching the posterior mesial skin-surfaces. In this way contamination of the fingers is prevented.

The pelvic examination should then be made in the usual way, and all the necessary facts elicited as to the nature of the pelvis, condition of dilatation of genital tract, stage of labour, &c. As has been already said, repeated examinations should be avoided unless for special indications.

A very important point is the judicious and strictly conservative conduct of labour. Forceps should neither be used too soon nor delayed too long. Interference in the first stage should be made only on the strictest indications. Primiparæ should have their due time allowance awarded them, and the second stage especially should have its full three to four hours for its work. In all cases, and especially in forceps and turning, undue haste in delivery should be avoided so as to get a minimum of laceration. Patience and a fair allowance of time are well rewarded in the conduct of labour. Deep cervical lacerations and bad vaginal and perineal tears are dangerous, require treatment involving additional risk of infection, and are difficult to keep aseptic afterwards.

It has often been a source of astonishment to all who have thought over the matter that puerperal infection cases have not undergone the diminution expected to ensue from our knowledge of prophylaxis, our use of antiseptics, and the possession of the means we now have of terminating slow labour safely. It has always seemed to me that this might be due in part to a too early use of forceps causing undue laceration, to an overweening confidence in antisepsis as *the* factor in the prevention of infection, and above all to the premature use of uterine manipulation to separate the placenta and membranes. Credé's method, when used to separate the placenta instead of being reserved to aid its expulsion when separated, tends to cause retention of bits of membranes and even of pieces of placenta, a sure way to court mischief. Such

residues, as already pointed out, are a medium for the growth of organisms and minor and major infection may thus result. The importance of the careful and skilful guidance of the third stage of labour is of paramount importance in avoiding causes of infection.

Lacerations of the cervix giving rise to hæmorrhage can be treated by pressure or suture when necessary, but it is a cardinal principle to avoid internal examination and manipulation after labour unless on the strictest indications. Perineal tears should be sutured when medium and beyond this.

So far our preventive measures during the labour have been :—

(1.) Avoidance of infection of the woman on the part of the examiner by the careful cleansing of his hands, with or without the additional precaution of the use of sterilised india-rubber gloves.

(2.) Avoidance of infection from the patient by previous careful cleansing of the external parts, so that no mischief is carried in by the examining finger.

(3.) Avoidance of undue laceration by care and skill in conducting the labour.

(4.) Avoidance of uterine manipulation to *separate* the placenta in the third stage of labour. This does not exclude manipulation during hæmorrhage.

(5.) General hygienic care during pregnancy.

When the labour is finished the external parts should be carefully cleansed, and upon the whole it will be advisable to give a hot douche, vaginal only, of weak lysol or boracic, so as to wash out clots and any débris present. The vaginal glass tube used should of course have been boiled. For this, in lieu of a steriliser, one can employ the domestic fishkettle with washing soda, and the same holds good for forceps and other instruments.

The practitioner has now to settle how the puerperium is to be conducted. Granted a capable nurse, instructions should be given her as to hand-cleansing, and then probably the best and least harmful procedure for her to follow is this. The cleansed slipper or bed bath is placed below the patient. No vaginal douche should be employed in an ordinary case,

but with fresh cotton-wool soaked in corrosive sublimate lotion (1—4,000) the external parts should be bathed and cleansed twice or thrice daily. The risk of vaginal douching is, that in a nurse's hands, mischief from the external parts may be carried deeper. Apart from this, the facts that the uterine cavity in a normal case is sterile and that the healthy tissues and secretions of the vagina have a bactericidal action on the various non-pathogenic organisms which may be found in it *post partum*, show that vaginal douching is unnecessary as a preventive. All the patient's vaginal discharges should be received into a sublimated wood-wool diaper. This soaks up the discharge well, is antiseptic, and its cost puts it within the reach of all.

There is no doubt, however, that an ideal labour in a normal case would be one where no internal examination was made at all ; and that this can be done in hospital with very little risk to the mother, though at the cost of some greater feeling of responsibility, has been abundantly shown by Leopold and others. In my own hospital service it was on one occasion carried out for two months quite safely. Curiously enough the first case examined internally after this period was one of prolapsus funis, where the avoidance of internal examination would have caused risk to the child's life. Supposing that this plan is tried, how can it be carried out ?

Abdominal palpation will be used to make out the presentation and position. If the head is felt in the upper strait of the pelvis and the external diameters are normal, the pelvis is not deformed. Auscultation will give information as to the fœtal heart and the nature of the patient's pains will help to make out the stage of labour she is in. Any bearing-down and bulging of the perineum will show that the second stage is nearing its completion, and thus mere external cleansing is all that is requisite. The third stage is, of course, managed without internal interference.

This method is not so suitable for private practice, but there the reduction of the internal examinations to a minimum, with the use of gloves, should give as good and probably more sure results.

3. *Special points as to the practitioner conveying sepsis from one puerperal case to another, or from septic surgical cases to*

labour ones.—If hand contamination of cases is so important, it behoves all to consider the question of how to avoid it most carefully. The judicious practitioner will avoid skin contact with septic surgical cases requiring dressing, and in operating on these will wear sterilised india-rubber gloves. There is no doubt that this practice is a great advance in our art, and practically the use of these absolves one from the responsibility of conveying infection from case to case. Before use they should always be tested to see that no puncture exists. Practically one could attend and treat locally a puerperal septicæmic case without infecting others, but whether it should be done must be settled by the special circumstances of the practice, and the question as to whether such a course might not be misunderstood. If it gave rise to misinterpretation it would be better to avoid all risk and close attendance on other cases until all risk of contamination was over.

In summing up, it seems to me that the precautions given for the avoidance of puerperal infection are not too elaborate, can be followed out in all cases by the practitioner and nurse, and should lead to a suppression of the cellulitic, peritonitic, and tubal cases which crowd up our gynæcological wards, and above all to a further diminution of the mortality from septicæmia. Puerperal infection is preventable, and should be prevented by conscientious individual effort.

THE MIDWIVES ACT, 1902.

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THE intimate connection that has been shown to exist between the uncontrolled practice of midwifery by ignorant and untrained women and the continued prevalence of puerperal fever in this country was one of the main causes of the demand for legislation in regard to midwives. Hence it cannot be considered irrelevant to include, in a number of this magazine specially devoted to the consideration of puerperal fever, a brief account of the Act of Parliament which was the outcome of that demand. The case for legislation was so fully set forth by the present writer, in an article which appeared in the *Contemporary Review* for March, 1898, that it is unnecessary to repeat the arguments here.

The history of the movement that culminated in the passing of the Midwives Act, 1902, has yet to be written. It is sincerely to be hoped that it will be undertaken not only by a competent and impartial person, but also soon, *i.e.*, before the materials become difficult of access and whilst those who took a principal part in the struggle are still alive and able to furnish information at first hand. If undertaken in the right spirit and by the right person such a history cannot fail to be extremely interesting and valuable. It will not only be an important contribution to the study of social conditions in this country at the end of the nineteenth and the beginning of the twentieth century, but it will have considerable interest for the student of human nature, for the struggle found play for all the forces, good, bad and indifferent, that a hotly disputed question supposed to affect class interests could possibly arouse. Great things were hoped from legislation ; terrible things were feared. The objections raised were indeed legion, and, as usual, often contradicted one another. The late Lord Chief Justice Cockburn once stated that it was his habit periodically to take down his Euclid and go carefully through a proposition or

work out a problem in order to keep fresh within his mind the laws of ratiocination. It would not be a useless exercise for Members of Parliament and for any of us indeed who find ourselves engaged in a legislative controversy to take down from time to time Sydney Smith's essays, and, turning to the review of Jeremy Bentham's *Book of Fallacies,* read " Noodle's Oration," in which the great humourist has embodied all the ordinary fallacies into which writers and public speakers are apt to fall. It will well repay perusal. It is as true a satire on the parliamentary and much other oratory of to-day as it was on that of the early part of last century. When listening to the harangues of excited speakers on the midwives question one could not help thinking of this famous oration and wishing that it were possible, without giving offence or committing any breach of good manners, for somebody to stand up and read it. But all this oratory gradually lessened both in bulk and in virulence, and the Bill became law without any violent protest on the one side or any triumphal orgy on the other. It will not, any more than other Acts of Parliament, have the tremendous results either for good or for harm that were prophesied for it. But meantime it was a much needed piece of legislation, and, although it will produce no cataclysmic effects, it is assuredly destined to bring about a quiet and gradual, but none the less real and permanent, alteration for the better in the conditions under which in this country women of the poorer classes are attended during childbirth.[1]

It is proposed to consider the Act, clause by clause, in order to lay before our readers, with as much detail as space permits, (1) the objects that the promoters of legislation had in view ; (2) the manner in which they endeavoured to attain those objects ; (3) the changes that the Bill underwent in its passage through Parliament. The general effect of the Act, so far as it can at present be estimated, is dealt with in a separate article.

[1] The effects of the Act will, it is safe to predict, be felt far beyond its immediate range. " Who knows," says Sir William Sinclair, " but tnat it may be tne passing of the Midwives Act which will compel the reforms so much required in the education of the student of medicine, and bring about a sort of revolution in the practice of obstetrics in England, profoundly influencing the professional life of every general medical practitioner in the country ? " *The Midwives Act,* 1902, *and the Teaching of Midwifery to Students of Medicine.* An Address delivered at the beginning of the course of obstetrics at Owens College, April 23, 1903 Manchester : Sherratt and Hughes. 1903. Page 5.

The main objects of the promoters are admirably summarised in the title of the Act, in which it is described as being "an Act to secure the better training of midwives and regulate their practice." The regulation of the practice of midwives was understood to include the drawing up of a code of rules and regulations to guide midwives in their practice, and the organisation of an adequate system of supervision. Before the Act passed, no sort of control was, or could be, exercised over the practice of midwives, unless they did something so outrageous as to bring themselves within reach of the criminal law. The Midwives Act for the first time provides the means for placing them under efficient supervision, and for dealing, not only with gross offences, but with cases of misconduct and incompetency of which hitherto no notice could be taken.

The first section of the Act provides that, after the 1st day of April 1905, any woman who, not being certified under this Act, calls herself a midwife, or assumes any designation implying that she is a person specially qualified to practise midwifery, will render herself liable to a penalty of five pounds. In other words this section gives legal protection to the title of "midwife." Hitherto, any woman, whether trained or untrained, was free to call herself a midwife. After the first day of April 1905 no woman can lawfully do this unless she has been enrolled as a midwife by the Central Midwives Board.

If the Act had gone no further than this it would have accomplished a great deal. It would for the first time have enabled the public to discriminate between trained and untrained midwives, and would thus have effected for the poorer classes of the community, in regard to midwives what the medical Acts effected for the community at large in regard to the medical profession. There were many, however, who thought that legislation would be useless unless uncertificated midwives were forbidden to practise. The promoters themselves had recognised all along that such a provision was most desirable, and would render legislation much more likely to provide an effectual remedy for the evils to which it was sought to put an end. But those of their advisers who had had experience of the ways of Parliament assured them, and indeed it had been intimated in almost so many words in the Report of the Select Committee of 1893, that the House of Commons

would not listen for one moment to any suggestion for the
penalising of practice, and accordingly none of the Bills intro-
duced into Parliament up to and including the year 1898 had
contained what was henceforth termed, for the sake of brevity
of description, a "practice clause." A proposal in that year
(1898) to introduce a clause of the kind called forth a spirited
remonstrance from some of the most energetic supporters of
legislation amongst the lay public. A number of objections
was formulated and forwarded to the committee entrusted with
the preparation of the Bill. In this document it was urged that
the prohibition of practice for gain by other than certificated
midwives would create a monopoly of a kind which is never for
the public interest, would be a severe and unnecessary infringe-
ment of the liberty of the individual, would inflict grave hard-
ship in many thinly populated districts ill supplied or not
supplied at all with trained and certificated midwives, and
would introduce a most anomalous condition of things unless
the State were prepared to guarantee an adequate supply of
trained midwives in every part of the country.

When, however, in accordance with the advice given by
the Duke of Devonshire, then Lord President of the Council,
to a deputation that waited upon him on the subject, the
General Medical Council was consulted as to the provisions of
the Bill, it was at once made evident that no Bill would receive
the approval, much less the support, of that body, that did not
contain a practice clause, that did not, in other words, prohibit
under penalty the habitual practice for gain by untrained and
uncertificated women. When the next Bill came to be drafted,
therefore, it was felt desirable, with a view to obtaining the
goodwill, if not the active support, of the General Medical
Council and, through it, of the Government, to introduce such
a clause, notwithstanding the objections that had been raised,
and accordingly in the Bill of 1899 and in that of 1900 a
penalty was imposed on all uncertificated midwives who
habitually practised for gain. But, in the course of the House
of Commons debate on the Bill of 1900, the Home Secretary
(Mr. Ritchie) declared himself strongly opposed to the practice
clause (chiefly it is understood on the ground that it created
a new crime) and therefore to the Bill as it stood, and in the
result the Bill was talked out by its own friends as a preferable

alternative to its rejection. In 1901 the supporters of the measure failed to obtain a place at the ballot, and there was no opportunity of having a Bill introduced. But in 1902 fortune smiled and a fresh Bill was brought in. In this Bill the practice clause was omitted. It had been a very difficult matter to decide upon, for the omission involved an apparent breach of faith both with the General Medical Council and with the public.[1] It was felt, however, that to bring in a Bill with the knowledge that its most distinctive clause would be opposed by a strong member of the Government, would be to ensure its rejection.

After one or two unimportant amendments had been disposed of, Dr. Ambrose moved, and Mr. T. P. O'Connor seconded, the re-insertion of the practice clause. The Home Secretary, taking the same line that he did in 1900, opposed the amendment. But, contrary to all expectation, it soon became manifest that the feeling of the House was against him, and finally the Member in charge of the Bill (the late Mr. Heywood Johnstone) accepted the re-insertion of the clause with the very important modification that it should not come into operation until the year 1910. When, a week later, the Bill came on for third reading, the matter was again discussed, but although Mr. Ritchie once more expressed his dislike of the clause, he said that he preferred the Bill as it was to no Bill at all, and that on that ground he did not intend to offer any opposition. There can be no reasonable doubt that but for Mr. Heywood Johnstone's happy inspiration the Bill would have been wrecked. His proviso, which served greatly to minimise, if not entirely to obviate, the hardships and difficulties that the adoption of the clause might otherwise have produced, conciliated opponents, and was apparently the means of inducing the Home Secretary to abstain from hostilities that from such a quarter would have been fatal. In the House of Lords the clause was again in peril, but, notwithstanding the opposition offered to it by the Lord Chancellor, it was eventually agreed to, and the Bill was passed without any serious alteration.

[1] The Home Secretary, subsequently, in a speech to a deputation from the British Medical Association, took upon himself the responsibility of the apparent change of front on the part of the promoters and exonerated them from any charge of bad faith.

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It may seem that the parliamentary history of this particular clause has been here told at disproportionate length, but it must be borne in mind that, in the opinion of many of those who were most competent to form a judgment and certainly in the opinion of the promoters, this clause made all the difference in the value of the Bill. Without it, the measure would have been weak and ineffective ; with it, few will deny that it is a strong measure, and that, as such, it is far more likely than a weaker measure to effect all that can be effected by legislation.

Under section 1, subsection 3, it will be noticed that the word " certified " is used instead of the word " registered " which is used in most of the earlier Bills. The change was made in deference to the wishes of many members of the medical profession, who thought that the use of the same word as that employed in the Medical Acts might lead to misunderstanding and confusion. The dignity and privileges of the medical profession are further safeguarded by the fifth subsection, which enacts that no certificates granted under this Act shall confer any right to be registered under the Medical Acts, or to " assume any name, title, or designation implying that [the holder] is by law recognised as a medical practitioner or that she is authorised to grant any medical certificate, or any certificate of death or of stillbirth, or to undertake the charge of cases of abnormality or disease in connection with parturition."

The only comment that needs to be made on the provisions of this fifth subsection is this, that, while the Act does not confer upon the midwife enrolled under it any new right, by virtue of her enrolment, to grant the various certificates enumerated, it does not deprive her of any rights of the kind that she may have already possessed in common with the rest of the public. For example, there is at present no law requiring the registration of stillbirths, and any person, midwife included, who happens to be present at the birth, is at liberty to declare that at such and such a time and in such and such a place a certain woman was delivered of a stillborn child. The Midwives Act does not interfere with this liberty.

The second section of the Act sets forth the conditions upon which women may claim to be enrolled as midwives

within the first two years from the date of the Act coming into operation. These conditions include the possession of a certificate in midwifery from (1) certain bodies, one English, the other Irish, which have been in the habit of holding voluntary examinations for midwives, such examinations having been of an independent character in the sense that they were not examinations of pupils conducted by their own teachers ;[1] (2) certain of the Dublin Lying-in Hospitals which have long been famous as training schools in midwifery and whose claim that their certificates should be accorded statutory recognition was successfully pleaded during the passage of the Bill through Parliament ; (3) such other hospitals or institutions as may be approved by the Central Midwives Board. If not entitled to claim admission to the roll by virtue of the possession of any of the above certificates, a woman may, up to April 1, 1905, still claim admission if she can produce " evidence, satisfactory to the Board, that at the passing of [the] Act she had been for at least one year in *bonâ fide* practice as a midwife, and that she bears a good character."

No similar measure has ever been passed without some such provision as is set forth in the concluding words of this section. Thus, doctors who had been in practice before a certain specified date were exempted from the provisions (as to qualification for registration) contained in the first Medical Act (1858), and dentists who were actually in *bonâ fide* practice before the 22nd of July, 1878, were exempted from the provisions (as to qualifications for registration) required by the Dentists Act. It was objected in many quarters that the provision for admitting women already in practice would have the effect of granting legal recognition to a large number of incompetent persons, of persons indeed of the very type of which it is the avowed object of the Act to get rid. The

[1] It would be tedious to describe here the persistent and unworthy attempts that were made during the passage of the Bill through Parliament to eliminate the Obstetrical Society of London from any mention in the Bill. These attempts were fortunately frustrated. Had they succeeded the Obstetrical Society would have been deprived of a recognition that it had justly earned for its excellent and for a long time unremunerative work in organising and conducting a voluntary examination for midwives, and the women who had obtained its certificates would have been treated with equal injustice, inasmuch as they had spent time and money in their training, and had voluntarily submitted themselves to the test of an independent and therefore impartial examination.

promoters of legislation felt this difficulty as acutely as the objectors. But it is, as has been already shown, a difficulty that the practice of the Houses of Parliament has rendered inseparable from the introduction of all fresh systems of registration of this kind. Fortunately, it is a difficulty that will be only temporary, and, even as it is, it is not without its compensating advantages. For, seeing that it is impossible, the moment the Act comes into operation, to replace all the untrained women now in practice by properly trained midwives, and that the gap must be filled, it is well that the untrained women already in practice should be permitted to enrol themselves if they are willing to do so, and if they can produce evidence of good character. This will have the double effect of ensuring (1) that the poorer classes of the community shall not be left entirely without attendance, and (2) that the conduct and methods of practice of these midwives shall for the first time be brought under efficient supervision and control.

The third section of the Act deals with the constitution and duties of the Central Midwives Board. It was the object of the promoters to ensure (1) that the various interests concerned should all be duly represented ; (2) that the appointment of members of the Board, other than those appointed by the Government, should rest with responsible institutions ; and (3) that the majority of the Board should consist of members of the medical profession. To carry out this object, it was provided in the Bill that the Royal College of Physicians, the Royal College of Surgeons, and the Society of Apothecaries should each in its capacity as a responsible medical body have power to appoint one member, who might either be a man or a woman, but who, in either case, must be a registered medical practitioner, the idea of course being that the members so appointed should represent not individual institutions but the knowledge, experience, and interests of the medical profession as a whole. In order that the interests of the midwives themselves might be fairly represented, it was further provided that the Incorporated Midwives Institute should also have power to appoint a member.[1] The member so appointed, however,

[1] *See* "Supplementary Note on the Incorporated Midwives' Institute" appended to this paper.

was not to be one of themselves, but a registered medical practitioner.

Thus, in a board which it was at that time suggested should consist of seven members, a majority of medical members was secured. As the Act placed upon the county councils the duty of arranging for local supervision and the responsibility of making good any pecuniary deficit that might occur from time to time in the administration of the Act, it was deemed right that they should have a representative on the board, and the appointment of such a representative was accordingly placed in the hands of the Association of County Councils.

The representation of the general public, and of the poor lying-in women, whom it was the chief object of the Bill to benefit, was provided for by leaving the appointment of the two remaining members of the board in the hands of the Lord President of the Council, with the proviso that one of the two so appointed should be a woman. It was thought that, although the whole board would be in duty bound to consider the interests of the parturient woman as paramount, the appointment of two members who should be responsible to no particular corporation or institution would be the best way of ensuring that the interests of the public should not be overshadowed by those of any special class, however powerful its organisation.

During the passage of the Bill through Committee, a claim was put forth on behalf of the Royal British Nurses Association, that the Association should have the privilege of appointing a representative to a seat on the board, but the proposal was rejected by a large majority (24 to 3). When, however, the matter was again brought forward in the House of Commons itself by Mr. T. P. O'Connor, this decision was reversed, Mr. O'Connor's amendment being, as the result (it is understood) of a compromise, agreed to without a division. It is difficult to appreciate the grounds upon which the Royal British Nurses Association felt justified in seeking to be represented, for it had taken no part in promoting legislation, and could in no sense be held to represent either the midwives' interest, or indeed any of the interests concerned.[1]

[1] Of its 2,000 members not more than 300 held a certificate in midwifery, and of these, it was stated on the authority of one of the honorary secretaries, not one was a practising midwife.

It was not to be wondered at that the Queen Victoria's Jubilee Institute should at once bestir itself to secure a similar privilege. Its claims were indeed much stronger, for no fewer than 600 of its members were certificated midwives, and it had a larger number of midwives under its control than any other association concerned with district nursing. Accordingly, an amendment was proposed and carried, whilst the Bill was in the House of Lords, by which the Jubilee Institute obtained the right to appoint a representative on the board, the result being that, by the time the Bill became law, the number of members had been increased to nine.[1]

The Act provides that one of the two members to be appointed by the Lord President must be a woman. As each of the two nursing associations that had now been empowered by Parliament to appoint a member chose a woman as their representative, there were, when the board was fully constituted, three women upon it. As all three were certificated midwives, or trained nurses with midwifery experience, it need scarcely be said that they brought to the deliberations of the Board a practical knowledge that has proved of the very greatest value.

The term of office for which the members of the Board are appointed varies, being two years in some cases and three in others. The object of this arrangement, it need scarcely be said, is to ensure that there shall always be upon the Board a certain number of members who are familiar with the character of the work. It will be observed that no provision is made for the payment of members. The promoters were of opinion that unpaid members, having no selfish interest to serve, would be more likely to form a satisfactory and hard-working board than a body of paid members. They did not, however, foresee that, by omitting all mention of payment, the board when constituted would be precluded, as it has been, from voting to the country members their out-of-pocket expenses when attending the meetings. This is recognised by the board as an injustice to members who have to come a considerable distance, and the Privy Council has been appealed to on

[1] It may be stated now, after an experience of nearly two years, that even a larger board than this is needed in order to cope satisfactorily with the ever-increasing amount of work that has to be done. When an amending Act comes to be considered, this is one of the points that will, no doubt, receive attention.

the subject more than once. The answer, however, has been the same on each occasion, viz., that, without alteration of the Act, the Board could not legitimately pay even the travelling expenses of its members.

The remainder of section 3 deals with the duties of the Central Midwives Board. These duties include the framing of rules and regulations, the appointment of examiners, the deciding as to the places where and the times when examinations shall be held, the publishing annually of a midwives roll, the issuing and cancelling of certificates, and the removing of any name from the roll for disobeying the rules or other misconduct, and the restoring to the roll of the name of any midwife so removed.

The rules framed under this section had to be submitted to the Privy Council for approval before they became valid, whilst the Privy Council, in its turn, had to submit them for the consideration and comment of the General Medical Council, and was bound to take into its consideration any representations with regard to them that the General Medical Council might make. Though not compelled by statute to do so, the Privy Council also submitted these rules for the consideration of the Home Office and the Local Government Board. All this, it may easily be imagined, took up a great deal of time, especially as a minority of the Central Midwives Board submitted for the consideration of the Privy Council a separate report. At last, however, on the 12th day of August 1903, at the Council Chamber, Whitehall, there being present the Lord President, Lord Balfour of Burleigh, Lord Lister, Mr. Akers Douglas (Secretary of State for the Home Department), and Mr. Walter Long (President of the Local Government Board), together with the Clerk to the Council, Mr. Almeric W. Fitzroy, the Lords of the Council were pleased to approve of the rules for the period of three years. At the end of that time they will have to be revised and re-submitted. This is an excellent arrangement as it will afford time for testing the practical working of the rules and give a definite opportunity for introducing any alterations that experience has shown to be desirable.

As the Act places it in the power of the Central Midwives Board to remove the name of any midwife from the roll for

misconduct, the law officers of the Crown very properly insisted
that, in order to prevent an arbitrary exercise of this power,
there ought to be liberty to appeal from the decision of the
Board to the High Court of Justice, and the fourth section of
the Act accordingly provides for such an appeal.

The fifth, sixth, and seventh sections deal respectively with
the subject of fees and expenses, the midwives roll, and the
appointment of a secretarial staff.

The only comment that need be made on this portion of
the Act is that unfortunately no provision is made for ensuring
that medical practitioners when summoned by midwives in
obedience to the rules laid down under the Act shall be paid
for their services.   The committee charged with the preparation
of the Bill discussed the question over and over again, and
although they fully recognised the justice of some such pro-
vision and quite saw how much it would conduce to the smooth
working of the measure, they entirely failed to see their way
to any feasible suggestion.

The difficulties in the way of a practical solution of the
problem are very great.   Amongst them are the risks of
pauperisation of the people, the temptations to professional
collusion, and the financial difficulties, which last would of
themselves have been sufficient to wreck the Bill.   And so, in
the end, the question was left to be dealt with by Parliament
itself, or to be postponed until the practical working of the
measure had furnished more precise data for formulating a
scheme than any that are at present available.

The matter has, however, not by any means been allowed
to drop, for at its meeting on the 25th of February 1904, the
Central Midwives Board, recognising the need of some arrange-
ment being made as soon as possible, passed a resolution to the
effect that the Government be requested to take the necessary
steps for amending the Midwives Act, so as to provide for
the payment of legally qualified medical practitioners when
summoned to the assistance of midwives in difficult cases.

A copy of the resolution was sent to the Privy Council
and was duly acknowledged, but no action has as yet been
taken.[1]

Important as this fee question is, there is at present some danger of too much
prominence being given to it, and of an attitude being adopted that is certainly

The subjects with which sections 8 and 9 are concerned are the definition of local supervision and the machinery for carrying it out. The duty of local supervision is entrusted to the council of every county and county borough throughout England and Wales, including the council for the administrative county of London. This duty may, if any county council think fit, be delegated to the district councils within the county. Whether the county council retains the powers of the local supervising authority in its own hands, or delegates them to the district councils, the actual exercise of the powers and duties may be entrusted to a committee consisting either wholly or partly of the county council or district council, as the case may be, and upon this committee women are eligible to serve.

The duty of the local supervising authorities is defined as including general supervision over all midwives practising within their area; the investigation of charges of malpractice, negligence, or misconduct on the part of such midwives, and the reporting upon the same to the Central Midwives Board; the reporting to the said Board the name of any midwife practising in their area convicted of an offence; the suspension of any midwife from practice if it appears necessary in order to prevent the spread of infection; the supplying the Central Midwives Board annually with the names and addresses of all midwives practising within their area; the reporting to the said Board the death of any midwife or any change in the name or address of any midwife in their area; and the giving of due notice of the effect of the Act to persons in their area who are at present using the title of midwife.

It was no part of the function of the Central Midwives Board to direct the local supervising authorities as to the manner in which they should carry out these duties, but as the Board was constantly being appealed to on the subject, it issued

not in accordance with the best traditions of the medical profession. It has never been customary for members of that profession, when summoned to a case of emergency, to stop to enquire whether the fee was safe, or, likewise business men, whether the patient's credit was good. Alluding to statements in the medical journals to the effect that, in some districts, the medical practitioners are refusing to go to the assistance of a midwife, to relieve suffering or prevent disaster, unless their fees are guaranteed, Sir William Sinclair pertinently asks, "Who guarantees their fees now, [*i.e.*, when they themselves attend these cases, and] when they have to endure, in addition, the irksomeness and waste of time required in watching the phenomena of a physiological process?" *Loc. cit.*, p. 14.

the following " suggestions " to such of the county councils or
county borough councils as chose to apply for them :—

    1. That it was advisable for the county councils to retain
the administrative duties assigned to them so far as
possible in the hands of a committee directly appointed
by themselves.

    2. That the health committee of the county council would
form a suitable committee to act as the local super-
vising authority with power to add to its number from
outside the council or otherwise.

        That, in counties where there is no county medical
officer, a special medical officer should be appointed to
advise the committee.

    3. That supervision should be regarded as at least in part a
medical duty, and that the medical officer of health
or the medical adviser specially appointed, should
be empowered to act as the executive officer of the
committee.

    4. That, inasmuch as the duties of the local supervising
authority affect women almost solely, there should, as
sanctioned by the Act, be included in any committee
appointed to exercise the functions of the authority,
one or more *women* conversant with the needs of the
poor in the district.

Many of the county councils adopted these suggestions
either in whole or in part, but the interest and activity, shown
by the various county councils and by their medical advisers,
have hitherto varied enormously in different parts of the county,
so that whilst the administration of the Act in one place is
likely to be thoroughly effective, in another it promises to be
so lax and half-hearted as to rob the measure of much of its
capacity for good.

The tenth to the fifteenth sections of the Act deal respec-
tively with the duty of midwives to notify to the local supervising
authority their intention to practise within the area of the
authority and to renew that notification every January ; the
penalties for obtaining a certificate by false representation and
for wilful falsification of the roll ; the prosecution of offences ;
the right to appeal from any court of summary jurisdiction to

the court of quarter sessions; and the mode in which the expenses of the local supervising authority are to be defrayed.

There then follows a section stating that nothing in the Act respecting midwives shall apply to legally qualified medical practitioners, and the Act concludes with a limitation of its provisions to England and Wales, a proviso that for all purposes of the Act the English Branch Council shall occupy the place of the General Medical Council, a definition of the term " midwife," the permission to cite the Act by a short title and the fixing of the date, April 1, 1903, for the Act to come into operation, except as otherwise provided by the Act itself.

This paper is already long, perhaps too long, but it ought not to close without some expression of profound thankfulness that Parliament has at least seen its way to pass an Act with the definite object of providing for the proper training of midwives, and for controlling and supervising their practice. It is at any rate a great step towards combating a condition of things which was a disgrace to us as a nation, and if its provisions are shown by time and experience to need modification in order to be truly effective, an amending Act will be obtained comparatively easily now that a Midwives Act already exists.

SUPPLEMENTARY NOTE ON THE INCORPORATED MIDWIVES INSTITUTE.

As there is a good deal of misconception with regard to the justice of the claim of the Incorporated Midwives Institute to be represented upon the Central Midwives Board, it may be well to point out upon what that claim is based.

It will scarcely be denied that there should be upon the Board someone whose duty it is to watch the interests of the trained midwives of this country who are now for the first time to be placed under legal control, and whose practice is henceforth to be conducted according to rules which it is the business of the Board to draw up. How could such representation be best secured? Obviously by placing the nomination in the hands of a body governed entirely by midwives, provided such a body exists, and provided that it fairly reflects the views of the best class of trained midwives. The Incorporated Midwives Institute fulfils these conditions and is the only body that does.

It was natural and fitting, therefore, that to it should be granted the duty of nominating a member of the Board to represent the general body of trained midwives.

The Incorporated Midwives Institute had, moreover, special claims to consideration. It was founded in the year 1881 by Miss Louisa Hubbard and Mrs. Henry Smith (formerly Miss Zepherina Veitch and herself a trained midwife) with the object " of raising the efficiency and improving the status of midwives and of petitioning Parliament for their recognition." In 1889, with a view to promoting a Midwives Bill, which, if not done by the Institute, did not at that time seem likely to be done at all, the Institute sought to be, and was, incorporated under the Companies Act. It is interesting now to read the thirteen names, including those of seven women, which were appended to the articles of association. They were as follows :—Miss Louisa Hubbard, Mrs. Henry Smith (who died in 1894), Mrs. Scharlieb, M.D., Miss Freeman (formerly matron of the British Lying-in Hospital), Miss Wilson (now President of the Institute and one of the two members of the Central Midwives Board appointed by the Lord President of the Council), Miss Rosalind Paget, Miss Fynes-Clinton, Sir John Williams, Bart., M.D., Lieut.-General Sir Frederick W. J. Fitz-Wygram, Bart. (but recently deceased), Mr. Thomas Bryant, F.R.C.S. (then President or the Royal College of Surgeons of England), the late Mr. Wm. Rathbone of Liverpool, the late Mr. H. Fell Pease, M.P., and the late Dr. J. Syer Bristowe (then Senior Censor of the Royal College of Physicians). The Midwives Institute thus became the promoter of the first Midwives Bill ever introduced into Parliament, that, namely, of 1890.[1] It has never ceased from that day to this to take an active interest in the subject, and has furnished one or more representatives to each of the

[1] The Bill itself was the indirect outcome of enquiries as to the causes of infant mortality undertaken by a committee of the Obstetrical Society of London, at the instigation of Dr. W. Farr of the Registrar-General's office. The committee was appointed in February, 1867, and made its second and final report to the Society in December, 1870. It was suggested in this report that the following, amongst other recommendations for legislative enactment, should be brought by the Council of the Society before the Home Secretary:—

" That no person should be allowed to perform the duties of a midwife or accoucheur unless he or she shall have received proper instruction, and shall have given evidence before a competent examining board of possessing knowledge and experience adequate to attendance in cases of natural labour ;" and further,

' That an Examining Board be forthwith appointed for the purpose of testing

Committees that from time to time have been charged with the preparation and drafting of successive Bills. It has, all this time, kept up amongst its members a high professional standard. Recognising that a higher value must always attach to an independent examination than to a mere school or hospital examination, however severe (conducted as it invariably is by the candidate's own teachers or their colleagues), the Institute has always advised midwives that they should not be content with passing any examination short of the best available, and as the only independent examination held in this country was that of the Obstetrical Society of London, it recommended all pupil midwives to enter for this examination and it admitted no woman to its membership who had not passed it. Recognising, further, that to have received a thoroughly good training was of even more importance than to have been able to pass an examination, however searching in its character that examination might be, it has always made it its business to ascertain which were the best training schools and to recommend them accordingly. It may be said, indeed, that amidst innumerable difficulties, discouragements, and misrepresentations, it has never faltered in its pursuit of the objects for which it was founded, and it has certainly, by the studious moderation of its leaders, been enabled to play a conspicuous and dignified part both in obtaining legislation and determining its character.

the knowledge of midwives, and for the purpose of issuing certificates of competency."

After having satisfied itself that no immediate action was to be expected, either on the part of the State or on the part of the great medical corporations of London, the Obstetrical Society resolved, in 1872, to meet the case, as far as it could in the meantime, by instituting voluntary examinations of its own for midwives. These examinations have continued ever since. For several years after their inauguration the Society continued at intervals to send up deputations to the Home Secretary and to the Lord President of the Council on the subject of legislation for midwives. But though favourable replies were given and promises of Government action were made, something invariably occurred to prevent the carrying out of these promises. Accordingly, after the year 1879, the Society did not, *in its corporate capacity,* make any further approach to the Government. Two of its fellows, however—Dr. Graily Hewitt and Dr. J. H. Aveling—were determined that the question should not be allowed to rest Most valuable help was given by both of them (quite independently of each other) in the preparation of the Midwives Bill of 1890, and one of them (Dr. Graily Hewitt) shared with Mr. F. R. Humphreys the representation of the medical profession upon the committee charged with the drafting of that Bill.

A CRITICISM ON THE MIDWIVES ACT, 1902.

BY JAMES GREY GLOVER, M.D.,

Ex-Member of the General Medical Council.

I HAVE been asked to write on the Midwives Act from the point of view of the general practitioner. And I gladly comply with the request. Until now the Midwives Act has been rather an abstract and academic question. The existence, or rather the persistence, of a high mortality among lying-in women—as high as obtained a generation back—and the fact that midwives, often ignorant and illiterate, and sometimes dirty and intemperate—attended about 60 per cent. of the cases, made the passage of a Midwives Bill in some form an obvious necessity, especially as it had been shown to demonstration that a very modest training of midwives, and the placing of them and their work under medical supervision, almost abolished the danger of the lying-in state and reduced to an almost incredible degree its disasters of death and morbidity. This demonstration was a veritable discovery—beginning with Semmelweis and consummated in every well-conducted maternity hospital or charity in Europe and America.

It is important to dwell on this double point, for it is the key to the selection of means for perfecting the measures for the extinction of puerperal mortality.

The plight of the lying-in woman has always had the sympathy of men, perhaps more than that of women. Only its frequency hinders. Familiarity breeds contempt. The " natural " theory of labour added to the unfortunate tendency. To regard the function of the uterus in labour as if it were a simple and harmless action, like that of the heart or the rectum in emptying themselves of their natural contents, is a very imperfect and misleading comparison. The function of the uterus in labour is differentiated by two great points from that of other organs, either of which should move the sympathy and the interest of all but the selfish and the stupid. Firstly, its painfulness ; and secondly, its peril. Of the first we hear but little. Its expressions are controlled and labour is conducted in all available secrecy.

But the *peril* of childbirth has become the subject of legislation ; and the removal of it is the object of the Midwives Act. All the world knows now that lying-in women still die of puerperal fever much as they did a generation ago, and it also knows that where certain hygienic and antiseptic precautions are taken such mortality is reduced to a *minimum*, even in lying-in hospitals, which were on the point of being shut up as the chief seats and centres of puerperal poisons. We need not go into any detailed statistics. They have been repeated *ad nauseam* in the medical press, in the Houses of Parliament, in the lay press, and in public meetings. It is pleasanter to go into the later statistics of those lying-in charities which demonstrate on a large scale the preventability by antiseptic measures of puerperal death and morbidity. The Rotunda Hospital of Dublin is a most valuable instance. It caters for the poorest classes with a large proportion of primiparous cases, notoriously most subject to septic accidents and, generally, of complicated and difficult labours. In the year ending Oct. 31, 1902, in the intern department there were 1,962 cases and 6 deaths, equal to 0·3 per cent. Of these only one was from sepsis or 0·05 per cent. Two were moribund on admission. In the extern department there were 4 deaths in 2,190 cases or 0·18 per cent. Two of them were cases of abortion and one of eclampsia. Equally striking are the results in the Royal Maternity Charity of London dealing with poor married women in their own homes. The Medical Report of 1903 shows that out of 3,044 deliveries there were but 2 deaths of mothers, a mortality of 0·06 per cent. ; one of these was a case of placenta prævia, in previous ill-health from tubercular disease.

Mrs. Garrett Anderson, M.D., recently at a dinner in support of the Women's Medical School, stated that in their maternity department only two maternal deaths had occurred out of 2,517 cases attended—one from apoplexy during labour, the death occurring some hours after delivery ; the other from eclampsia, 16 hours having elapsed before medical assistance was sought.

There are happy medical practitioners of long and various experience who say they have never lost a case of labour.

Such facts, compared with those of old midwifery, have

created a new and a clear standard of security for lying-in women.
They fall into line with the epoch-making work of Pasteur and
Lister. They show a midwifery case to be in fact, however
natural, one full of possibilities of disaster—a surgical case
with large tracts of exposed and wounded surfaces, ready to
admit or absorb any poison or microbe, which a careless
midwife—or even doctor—may harbour. No one is more
grateful for the creation of such a standard than the thoughtful
and educated practitioner of medicine who has been, and will
ever continue to be, the chief friend and refuge of lying-in
women.

So far the Midwives Act, I have said, has been a matter of
only abstract and academic interest; with the year 1905 it
becomes operative. And all kindly critics will look anxiously
for proofs of its efficiency. On and after April 1st of this year
it will be penal for a woman to use the " title of midwife
(either alone or in combination with any other word or words),
or any name, title, addition, or description, implying that she
is certified under this Act or is a person specially qualified to
practise midwifery, or is recognised by law as a midwife."

So gravely has the risk associated with the practice or
ignorant midwives impressed itself on Parliament that the
Legislature has further provided that " from and after April 1,
1910, no woman shall habitually and for gain attend women in
childbirth, otherwise than under the direction of a qualified
medical practitioner unless she be certified under this (Mid-
wives) Act." No other medical or surgical risk has moved
Parliament to a penalty of this kind, inserted in the Act, in
spite of the opposition of the leading members of the Govern-
ment in both Houses.

Having then got an Act so frankly recognising a great public
evil, and purporting to provide a remedy for it, we have to ask
how far is it likely to accomplish the ends for which it was
passed, and how long shall we have to wait for the abolition of
puerperal mortality to the extent we have shown to be possible
in actual practice, even in lying-in hospitals and in the homes
of the poor. This is the one great test by which the legislation
of 1902 will be judged. It is not, an Act to provide employment
for women, nor to protect the scanty interests of the medical
profession. Its object is to save the lives and health of poor

lying-in women with as little sacrifice of their sense of independence as possible.

It is too soon to speak of its effects. One or two immediate results must be noticed. The Act has alarmed many of the old-fashioned midwives, and it is said that three-fourths of them are not seeking enrolment.

The untrained midwives, who were "a numerous host," have been so alarmed by the requirements of the Act, especially by the supervision of their work which it provides for, that they have intimated their intention of retiring from practice. Miss Wilson, a member of the Central Midwives Board, in a very interesting paper on the training of midwives, and the organisation of their work in rural districts, shows this forcibly. Taking 20 English counties, she learns from county medical officers, that of 10,333 midwives practising only 2,682 up to October had certified or shown an intention to practise. In Northamptonshire Mr. C. E. Paget, medical officer for the county, says that 203 out of 341, or 59·5 per cent., of the midwives would prefer retiring to being supervised.

This retirement of doubtless the more unfit section of existing midwives is not in itself a matter of regret. But it will leave a great gap to be filled by, let us hope, a fitter section. What is the chance of the supply being forthcoming ? Mr. G. W. Duncan has kindly supplied me with the following interesting list of midwives, with their respective qualifications, appearing on the midwives' roll up to January 1, 1905. It will be remembered that the Act does not apply to Ireland or Scotland.

Royal College of Physicians of Ireland - -	5
Obstetrical Society of London - - -	3,787
Rotunda Hospital - - - - - -	189
Coombe Hospital - - - - - -	54
Queen Charlotte's Hospital - - - -	228
Liverpool Lying-in Hospital - - - -	153
British Lying-in Hospital - - - -	5
Glasgow Maternity Hospital - - - -	136
St. Mary's Hospital, Manchester - - -	140
Manchester Maternity Hospital - - -	27
City of London Lying-in Hospital - - -	61
Royal Maternity Hospital, Edinburgh - -	41

Salvation Army Maternity Hospital   -   -   17
National Maternity Hospital, Dublin   -   -   12
Limerick Lying-in Hospital -   -   -   -   6
Cork Lying-in Hospital -   -   -   -   -   7
Eden Hospital, Calcutta   -   -   -   -   2
Women in bonâ fide practice, July 1901   -   6,606

Total enrolled   -   -   · 11,476

The following table, for which I am indebted to Miss Hannam, secretary of the Obstetrical Society, shows with what leaps and bounds the numbers taking its certificate—which admits to the midwives' roll—are increasing. The numbers are for 10 years :—

1895	-	-	-	-	-	-	-	-	420
1896	-	-	-	-	-	-	-	-	461
1897	-	-	-	-	-	-	-	-	523
1898	-	-	-	-	-	-	-	-	604
1899	-	-	-	-	-	-	-	-	705
1900	-	-	-	-	-	-	-	-	754
1901	-	-	-	-	-	-	-	-	769
1902	-	-	-	-	-	-	-	-	996
1903	-	-	-	-	-	-	-	-	1,221
1904	-	-	-	-	-	-	-	-	1,507

This seems a great army of midwives. But two or three things must be noticed. More than half the number of those in the midwives' roll are, presumably, not possessed of any certificate from any training authority or hospital—in other words, are untrained. They are not the class of women under whose attendance—supplemented, when necessary, by medical help—the great results noted above in maternity charities have been obtained. Further, if it be true that three-fourths of the untrained midwives have retired, their places have probably not yet been filled by the members enrolled in the midwives' roll up to the end of December. Accordingly there is some anxiety lest the poor lying-in women should fall between two stools and be unable to procure either a midwife or a medical man. This anxiety found expression at a meeting in the Westminster Palace Hotel on November 4, presided over by the Archbishop of Canterbury. The principal business of the

meeting was to pass a very reasonable resolution moved by Dr. Cullingworth, averring that there was urgent need for a due supply of properly trained midwives, and commending the Association for this purpose.

While it may be allowed that the working of the Act must be a matter of some uncertainty, and even anxiety to those charged with the administration of it, I trust there will be no undue haste in drawing conclusions or in introducing ambitious changes in the training and status of midwives. Already there are signs of a tendency in this direction, which, if not checked, may make it as difficult for a poor woman to have a midwife as it is for her to have a trained hospital nurse or a medical man. Surely this is not the way to help the lying-in woman, neither is it the way to conciliate the medical profession, whose co-operation with the midwives is contemplated in the Act, and is, indeed, indispensable if it is to work well. It is notorious that a section of the profession was, and perhaps still is, deeply opposed to this legislation. But I think they were in a minority ; and I have no reason to doubt they will loyally accept the Act, and, if due public provision is made for their being paid for the assistance the Act requires midwives to demand from them in unusual cases, they will faithfully and cheerfully afford their help. It is of great moment that such public provision should be made without delay. The absence of such provision in the Act is a monstrous defect, and throws a great responsibility on its authors. The Medical Council saw that an Act without such a provision would not work satisfactorily, and recommended its insertion.

It was too much to expect that the Medical Council would accept a Bill creating an inferior and confessedly imperfect class of practitioners in midwifery, required when necessary, to summon medical aid, without demanding guarantees that the public should bear the cost where the patient was unable to do so. The Government, on some technical ground, declined to comply with the demand.

The Government can scarcely now refuse to supply the defect. To do so will be to gravely risk the lives of lying-in women, and to act unfairly to the new midwives and to the medical profession. I admit that it is a new kind of charge to impose. But the legislation is new, and the purpose for

which the charge is made is one that has appealed to all other nations. It is in the interest of the nation that puerperal mortality should be reduced to a minimum, and on the ground of mere humanity the claim is irresistible. Of course all reasonable steps must be taken to prevent undue expenditure.

There is good reason to think that the cost of paying medical men when called for by fairly competent midwives will not be much. In the Royal Maternity Charity of London, where 3,044 cases were attended in the year, with a marvellously low mortality, the assistance of medical officers was only sought in 71 cases, or in 2·3 per cent. of the whole. If this should be the proportion of cases in which medical assistance is called for under the Act, and midwives attend the same proportion of cases as now, the cost of medical assistance, at one guinea per case, would be £13,660. In case of operation or long distances the fee would, of course, be larger.

The ratepayers must be protected by the county and borough councils, which are charged with the local supervision of midwives. There are three great ways in which this expenditure may be kept within reasonable limits.

Firstly, by ladies of leisure and local influence interesting themselves in organising and administering maternity clubs in all districts, *especially in rural districts*, to stimulate the sympathy of the rich and the sense of independence in the members by encouraging them to make some contribution to a fund for getting help in the time of confinement.

Secondly, by efficient general supervision of the midwives and their work in the irrespective districts on the part of the local supervising authority.

Thirdly, by restraint on the part of the Midwives Board, of the tendency to overdo the training of midwives and to stiffen and multiply the examinations to which they are to be subjected. We regret on this point to differ seriously from Miss Gregory, whose work in this field has been untiring and self-denying. She desires at once to extend the training of certified midwives by requiring of them eighteen months of training in a general hospital and in monthly nursing—a hospital to be built for the purpose with a lying-in annexe—and six months of obstetric district training. Not only so. Miss Gregory further proposes to re-examine and instruct midwives every third year. This

ambitious programme seems to be somewhat a breach of the tacit understanding on which the Act was procured, to be at least a premature step, and one that will add to the difficulties of the situation. It will raise the cost of midwives and render them a kind of impracticable luxury. Besides, according to our present evidence, it is unnecessary. With midwives, qualified according to the Obstetric Society's rules, or some modest increase in their stringency, and duly supervised by medical practitioners, the best results are attainable. It cannot be right at present to add to the difficulties of getting the necessary number of midwives by immensely increasing the cost of their training. With a good understanding between the medical profession and the midwives and the midwives board— and to this last we attach the greatest importance—there should be no insuperable difficulty in having poor women attended, even in rural districts. Supposing the number of annual confinements to be 940,509 in England and Wales, and these to be equally distributed among registered medical men and the midwives now enrolled—and many more will doubtless be enrolled before March 31st under the present conditions—it would only give 26·5 cases to each. Medical men must still continue to cultivate midwifery. I have the strongest conviction that the success of the Midwives Act will depend on the extent to which midwifery is kept a part—and no mean part—of medical practice. Unless the medical examining bodies fail grievously in their duty to greatly improve the training in this respect of medical students and to bring up the conception of obstetric success to the full standard of that of surgery, judged by the amount of morbidity and mortality of the best hospital practice, the due influence of the medical profession over this great region of practice will not be maintained. For this the General Medical Council will be held responsible. It will be inexcusable if the Council fails—as it has hitherto failed—to recognise the immense importance of adequate clinical teaching in this branch of medical practice. It will be faithless alike to lying-in women and to the medical profession, of whose efficiency and dignity it is the recognised guardian. So far as I can learn the Act has had no bad effect on medical practice; nor will it have if the Medical Council and the medical profession do their duty. On the contrary it

will serve as a foil to set off the difference between the mere midwife's art and the whole art of medicine, and so to raise still higher the public estimate of our calling. This is a direction in which life has to be saved by thousands—life of the most important kind. And if young practitioners will take the trouble to grasp the facts which have led to the passing of the Midwives Act, they will do much to serve the cause of their profession, to advance the happiness of their own practice, and to gain the lasting gratitude of women of all classes.

SOME IMPRESSIONS OF PUERPERAL SEPTIC DISEASE IN ITS MORE SEVERE FORMS.

By A. KNYVETT GORDON, M.B. (Cantab.),

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IT is probably only in the wards of a large isolation hospital or workhouse infirmary that puerperal septic disease is met with in bulk, so to speak, and in its worst forms. From my experience of the disease, or collection of diseases rather, as it is met with in the Isolation Hospital for the City of Manchester, I propose to comment on some of the points that have struck me most.

The cases that are admitted to Monsall are those only which have been notified to the Medical Officer of Health and which are, in his opinion, suitable cases for hospital treatment; they have, in practice, come almost exclusively from among the poorer classes. As a rule they have not been notified to him until they are in a hopeless condition clinically. In some, perhaps, the severity of the illness has not been recognised until it has become strikingly obvious, but in others every effort has been made to keep the patient at home until the onset of delirium has rendered the patient unmanageable, or the fear of impending death has bred in the minds of the patient's attendants a desire that this shall not happen in the house. In either case the hospital is regarded as a receptive rather than a curative institution. I hope to show that this is not a justifiable point of view. In practice the bulk of our cases come into hospital in the second week after the onset of the " fever " or later.

The first thing that is apparent—and nowadays it is a very important point—is that the large majority have been attended at the actual confinement, not by medical men or even by trained or partially trained nurses, but by a neighbour who calls herself, and practises as, a midwife. Her practice is, however, often extensive, her fee is usually 10s. or less; she is generally dirty, pig-headed, and prematurely aged.

Under these circumstances it is difficult to obtain any accurate knowledge of what did, or did not happen at the confinement. By the courtesy of Dr. Niven, however, the Medical Officer of Health for the City, I have been supplied with any information he has been able to obtain from inquiry in the house or in the neighbourhood, and the certifying practitioner is asked to fill in a history form before the removal of the patient, but in practice, very few of the questions are answered in a reliable manner, for the practitioner has usually been summoned by the midwife late in the course of the disease, and, therefore, does not know much himself of the history of the case, and the relatives either cannot, or will not answer at all.

The condition of the patients on admission is pitiful in the extreme, in fact, it would be difficult for anyone who has not worked in an isolation hospital such as this to form any idea of what we habitually see. Mild cases we come across but rarely, the majority being either semi- or rather more than semi-comatose, with a high temperature ; sometimes they are maniacal : more frequently, perhaps, there is delirium of the low muttering type ; the breath has the sweet odour of septi-cæmia ; the patient is anæmic and sweating, the respirations are laboured, and the lips and tongue cracked.

On more detailed examination, the abdomen is generally found to be distended, sometimes to an extreme degree, especially in cases where morphia has been given freely without any attempt at local treatment, and there is consequently a proportionate amount of dyspnœa with hypostatic pulmonary congestion. The uterus is unduly large, and through a dilated os, a fœtid purulent, or acrid serous discharge is seen to be issuing. Generally there is a split cervix, frequently a ruptured perineum also. In three cases general peritonitis has been present.

It is, therefore, difficult to form an accurate idea of the ætiology of any given case on account of the multiplicity of the lesions through which the septic absorption can have taken place, but we are helped to a certain extent by the clinical and bacteriological investigation of the contents of the uterus.

The cases that I have seen appear to me to divide themselves roughly into three types, though mixtures of these have occurred in practice.

In one variety there is a condition of acute septic intoxication due to retention, and subsequent decomposition of placental tissue, membranes, or clot, and the patient usually recovers quickly when the offending mass is removed. On bacteriological examination we have usually found mixtures of staphylococci and streptococci with numerous other organisms of indefinite character. In this variety, which I take it, is that usually described as puerperal sapræmia, the onset has generally been within three days of delivery.

From what I can hear, there seems to be a popular idea that this kind of case is the most common, and also the most deadly, form of puerperal septic disease, but this has not been so in my experience; they have formed but a small percentage—about 10 per cent. of our cases here, and recovery has taken place in all of them.

Then there are the cases of a more purely septicæmic type, where nothing is found inside the uterus which would, at first sight, account for the symptoms. When the endometrium, however, is removed with the curette, though nothing may be wrong to the naked eye, it is found to be teeming with streptococci when examined bacteriologically. Usually, too, the discharge from the body of the uterus is not offensive, though that in the vagina may be. The majority of our patients have had illnesses of this type, and the onset has generally been a little later than in those where the mischief has been largely due to retained decidua—about the fourth or fifth day after delivery as a rule. Clinically, their condition has been of the typhoid type, and the peculiar odour of the breath to which I have referred has usually been markedly present. The results have been good, to my mind, when one takes into consideration the apparent hopelessness of their condition, and the period in the course of the disease in which they have come under observation; about twenty per cent. have recovered. In some, convalescence has been delayed by the supervention of pelvic inflammation, sometimes going on to suppuration, or thrombosis of the veins of the leg.

Lastly, there are the cases also of the septicæmic type, but which are due to the bacillus coli communis. Clinically, it is difficult to distinguish them, at first sight, from the streptococcal cases. In both there is an absence of any retention of

decidua, and the local conditions are the same in both cases. There is, however, both in the ætiology and the prognosis, a considerable difference between the two infections.

In the first place, the cases due to the B. coli appear to be infected at a much later period after delivery—in my experience, from the eighth to the twelfth day—and I believe that some of the cases which were described some few years back as of obscure origin, and which, in the absence of an accurate bacteriological examination, were often attributed to sewer gas, and so on, may have been due to this organism.

Clinically, the condition is one of extreme gravity, and the prostration is profound ; there is occasionally a peculiar yellowish earthy tinge of the skin. The uterine discharge, too, is often fœtid.

In my experience, the prognosis in cases where the B. coli is associated with severe septicæmia clinically is almost hopeless. The majority of our cases have died in the acute stage of the illness, while those that survived this, have succumbed later to thrombosis with septic embolism. In my experience I have never seen a case recover, and I am inclined to believe that the B. coli has been treated with scant respect in the past in connection with puerperal infection, there being, as I am informed, an impression amongst some obstetricians that it is of less importance than the streptococcal group of organisms.

For the treatment of the more severe forms of puerperal fever two essentials are required—an aseptic operating theatre, and a bacteriological laboratory on the premises. For bacteriological results to be of any but academic use they must be obtainable at once.

It is also essential that the medical staff who have to deal with these cases should have had some surgical experience, they are certainly not cases for the physician alone, nor is it right that they should be entrusted solely to the type of inexperienced resident that is found in some workhouse infirmaries.

It is difficult to estimate the comparative value of different methods of treatment in the more severe forms of any disease, and in the cases that I am describing this is particularly evident. The condition of the patient is desperate, and we have to attack the disease with all the means in our power simultaneously. Argument from the results is scarcely possible,

and I am constrained, therefore, simply to give my own personal impressions.

At Monsall, the cases are admitted to single-bedded wards, and, in the majority of cases, they are examined under an anæsthetic in the first instance, preparation having previously been made for any pelvic or abdominal operation that may be found necessary : not only the vagina and external genitals are disinfected, but the skin of the abdomen also. Cultures are taken from the interior of the uterus before any operative measure is commenced. Film preparations are also made, and, if necessary, examined forthwith.

In almost every case, it has been obvious that curettage of the uterus was necessary, and for this I always use a sharp curette, removing the endometrium down to the muscle. To my mind, a light sharp instrument is safer when the uterine wall is soft and friable than the blunt curette, and one is sure of being able to get the diseased tissue all away. With a blunt instrument, or, as I have seen advocated, the finger only, one can only remove tissue that is obviously loose, and stir up the remainder ; it is in this remainder that bacteriological evidence has shown us infection lies. I do not like a flushing curette, as, owing to the tubing on the handle, it can have no balance, and it is difficult to feel what one is doing with the other end.

If a sharp curette be used, however, it is of vital importance that the resulting raw surface shall be thoroughly disinfected, as, otherwise, dissemination and increased absorption of toxins is likely to occur, so, when the curette is laid aside, the interior of the uterus is thoroughly flushed with sterile water, or some weak antiseptic, at a temperature of 120° F. until all hæmorrhage has ceased, and any loose pieces have been washed away, and the surface is then dried as far as possible and mopped with pure izal, care being taken to reach every corner of the uterus. My reason for employing izal in this connection is that I found that, when applied to the ulcerated fauces in severe cases of scarlet fever, it seemed to have a selective action on the necrotic tissue, while the healthy mucous membrane was not affected by it. As, in the interior of the uterus, one cannot see what one is doing, it is necessary to use an antiseptic which is not an escharotic to healthy tissue. Moreover, izal is not toxic. Then any lacerated surface is

disinfected, and repaired if possible, though no attempt is made to perform an elaborate perinneorraphy, which is better done later on. In operating, every precaution is taken to secure sterility of hands, partly for the patient's sake, also, that we may not infect other cases that we may have to operate on subsequently. Rubber gloves are always worn.

Then, before the patient has recovered from the anæsthetic, an injection of an antistreptococcic serum is given, without waiting for the result of the bacteriological examination. At Monsall two varieties of antistreptococcic serum have been employed ; one is the polyvalent serum, made from a horse that has been inoculated with as many varieties of streptococci as possible—one of them being derived from a puerperal case ; this is on the market as polyvalent serum (Burroughs Wellcome & Co.). The other is a special serum that was kindly sent me for trial by the director of the Wellcome research laboratories, and was, I understand, prepared from streptococci isolated from cases of puerperal septicæmia only. Probably, the cases are not sufficiently numerous to generalise on, but I have been unable to distinguish between the effect of the two sera. Of the strength of any bactericidal serum we can have no scientific criterion ; probably, however, we do not give enough, and I have in practice employed from 50 to 100 cubic centimetres, which is given in one injection, and not repeated.

The monovalent antistreptococcic serum has been, in my experience, quite useless in puerperal cases, and I think it is greatly to be regretted that the difference between the action of the monovalent and polyvalent sera is not more generally known. The disrepute into which the monovalent variety has deservedly fallen is, I think, responsible for the failure to use the other.

No harm has resulted from its use in cases that have turned out not to be due to the streptococcal group of organisms, though—as in the cases due to B. coli—-there has naturally been no improvement. Occasionally rashes occur, but these are neither so frequent nor so severe as in the case of antidiphtheritic serum.

In the majority of our cases, curettage and the injection of antistreptococcic serum have been the only means employed ;

occasionally it is necessary to repeat the intrauterine douche, and rarely a second curetting has been necessary in convalescence, but of medicinal treatment I cannot speak with any fervour. I have given most of the antiseptics and antipyretics that have been recommended, and I have sometimes resorted to very free stimulation, but I cannot say that I have ever seen any demonstrable good result. Occasionally some of the complications have required surgical treatment.

In two cases general peritonitis was present on admission. One was in a moribund condition, and any operative treatment was out of the question, but in the other, in addition to curettage and repair of a badly torn perineum, I opened the abdomen. As the peritonitis, though well marked, was of a serous, and not a purulent type, I closed the wound without drainage. The patient made a rapid recovery until the occurrence, later on in convalescence, of thrombosis of the femoral and external iliac veins, caused her death from septic embolism.

The two most common complications have been pelvic suppuration and septic thrombosis of the femoral vein. In two of the inflammatory cases I had subsequently to open the abdomen for the relief of a pyosalpinx; both recovered.

In one of the cases of thrombosis the inferior vena cava was found to be full of firm clot. The peculiar feature of this case—which Dr. W. E. Fothergill kindly saw with me in consultation, and which was published in the *Journal of Obstetrics and Gynæcology of the British Empire*—was hyperpyrexia with a temperature of $111 \cdot 2°$ F. This I verified by taking the temperature myself with three thermometers.

It is, however, of great importance that we should see if the study of these more severe cases throws any light on that much-discussed subject, the prevention of puerperal infection in the first place.

Obviously, the first point is that the untrained " midwife " shall be done away with, if possible, or, at all events, restricted in her death-dealing operations. On this point I do not propose to dwell, but I cannot help feeling that the extension of the lying-in-hospital system would be a great benefit to the parturient woman of the poorer class. Is it too much to expect that this system should ultimately include the feeding

of the woman and the relieving of her domestic cares during the period of her puerperium ? I care not whether it take place by the building of new, and the extension of old, voluntarily-supported institutions, or by the raising of the level of the rate-supported mechanisms ; but the result of the untrained midwife, and sometimes, it must be confessed, of an ignorant or careless medical man, is not only puerperal fever, but also a more diffused complaint—chronic pelvic invalidism.

Then I think that more care should be taken in the prevention of infection by the bacillus coli. When one comes to think of it, most of the precautions recommended in text-books are directed towards the prevention of streptococcal infection at the time of delivery ; even in these there are some inconsistencies and more impossibilities. It is inconsistent, for instance, for the practitioner to take, as he frequently does, vigorous precautions to ensure that his forceps are sterile, and then to apply them freely to the surface of obviously septic external genitalia ; it is an impossibility to disinfect these external genitalia in private practice. Then it is not of much use for the practitioner to disinfect his hands carefully if the attendant " midwife " has been making (as she usually has) " examinations " before his arrival.

Two points, however, strike me as possible in the prevention of infection (with streptococci) at the time of delivery. One is that the medical man should take with him some sterile gauze with which he could cover up the external genitalia whilst making examinations or using instruments, and the other suggestion is that the wearing of rubber gloves—at all events, when it is necessary to introduce the hand into the uterus—may not be so absurdly impracticable as might appear.

It is true that I cannot claim any experience on this point, for it does not now fall to my lot to attend confinements ; but 1 always use them myself when making examinations in pelvic cases, and I cannot say that I find them any inconvenience. The great advantage of them in private practice would be that they could be boiled at home, and carried in sterile gauze to the patient's house, and the practitioner would be independent of the domestic variety of hand washing that so often gives such a false sense of security.

The infection with bacillus coli, however, occurs later on, after the practitioner has ceased, in most cases, to make vaginal examinations at all, and it is undoubtedly due to contact between the vulva and dirty clothing, or bedding, especially if diarrhœa be present also. Here the indication is obviously to avoid such contact ; in other words, to treat the vulva as if it were an open wound and cover it up. This end may be attained quite simply by ordering that the external genitals shall be protected with a pad of antiseptic gauze and wool, which should be changed whenever the bowels are open or the bladder emptied, as well as when it becomes soiled with lochial discharge.

But for the carrying out of this instruction the practitioner has to rely on the intelligence, goodwill, and absence of prejudice on the part of the relatives of the patient or the midwife. This often means that it will not be carried out at all.

ON THE PREVENTION OF PUERPERAL FEVER IN LONDON LYING-IN HOSPITALS.

By WILLIAM J. GOW, M.D., F.R.C.P.,

Physician to In-patients, Queen Charlotte's Lying-in Hospital; Physician-Accoucheur to Out-patients, St. Mary's Hospital.

THE chief lying-in hospitals of London were all founded between the years 1749 and 1765. London was the first town in Great Britain to possess a lying-in hospital, although in 1745 a hospital of this kind, now known as the Rotunda, had been opened in Dublin.

In 1749 a hospital for the reception of lying-in women was opened in Long Acre and this was the origin of the British Lying-in Hospital now situated in Endell Street. A year later the City of London Hospital started at London House, Aldersgate Street. In 1752 a hospital was founded in the west end of London and was known as the General Lying-in Hospital, Bayswater. The title of this hospital was subsequently altered to Queen Charlotte's Hospital, which is at present situated in the Marylebone Road.

In 1765 the Westminster Lying-in Hospital was founded in the Surrey Road and subsequently became known as the General Lying-in Hospital, York Road, Lambeth.

In the early part of the 18th century the practice of midwifery was largely in the hands of ignorant and unskilled midwives who were jealous of interference from male practitioners. The lack of opportunity for training such women finally was forced upon the public attention.

Previous to the foundation of the first lying-in hospital in 1749 an attempt had been made to meet the difficulty by Sir Richard Manningham. By his influence, in 1739, a ward of the parochial infirmary of St. James', Westminster, was set apart for lying-in women, and there he taught his students. He then brought into existence the first maternity institution in this country and stimulated the public mind to further projects in the same direction.

The writings of Smellie and William Hunter played an important part in still further arousing an interest in the study of midwifery.

It would thus appear that lying-in hospitals were originally founded to promote the study of midwifery and the better training of those women in whose hands the practice of this branch of medicine, at that time, mainly lay.

In the first half of the 18th century Paris was almost the only place where any systematic teaching was carried out, and even there it was, according to Smellie, who attended the clinique of Grégoire, far from satisfactory. Apart from the advantages of teaching, there were grave drawbacks attending the concentration of lying-in women within the walls of a hospital. Puerperal fever, the origin of which was then and for many subsequent years completely misunderstood, must from time to time have led to an appalling death-rate. The efforts of all the earlier physicians were directed towards the cure and not towards the prevention of this terrible scourge, a line of endeavour which was of necessity attended by failure. Into such disrepute in this respect did lying-in hospitals fall, that the accommodation for such cases in London hospitals is but little greater to-day than it was nearly 150 years ago. The prejudice even now has hardly died out although the danger of puerperal infection may now be safely affirmed to be less in lying-in hospitals than in the houses of the poor, and with the increasing demands for the training of nurses it is certain that some increase in the number of beds in lying-in hospitals will become necessary.

It was not until the dawn of the antiseptic era and the true knowledge of the cause of puerperal infection was demonstrated, that any real improvement was to be noticed in the mortality of patients in lying-in institutions. The treatment of acute puerperal septicæmia and pyæmia to-day, though less heroic, is but little in advance of the methods employed in the eighteenth century, but the occurrence of this disease in an epidemic form is now practically unknown. Endemic cases do and must occur. The genital canal of pregnant women is generally free from septic organisms, but in those who have recently suffered from gonorrhœal infection, staphylococci, and sometimes streptococci are found. The experience at Queen

Charlotte's Hospital is that, if no operative interference is required, such cases do well and usually run an apyretic course, but if the placenta be adherent and the introduction of the hand is necessary for its removal, the gravest risks are involved. In cases where a purulent antepartum discharge exists it is customary at an early stage of labour to swab out the vagina with strong mercurial or lysol solutions, but it is fully recognised that such treatment is eminently unsatisfactory and that by so doing it is impossible to really sterilise the canal. The main thing is to avoid making any vaginal examination lest septic germs may be carried up into the uterine cavity. For the same reason *post-partum* vaginal douching should not be practised, at any rate during the first four or five days after delivery.

The efforts to prevent infection in a case of labour can never be as perfect and complete as in a case of an abdominal or other surgical operation. It is impossible as a routine practice to sterilise the vulval skin as completely as the abdominal skin previous to an operation. The duration of labour, again, makes the risk of infection greater than in an ordinary surgical operation where the whole procedure is terminated in an hour or less. Cases of infection will, therefore, be met with from time to time, and the doctrine that is so strenuously taught in some quarters, that every case of this kind is due to preventable negligence on the part of the attendant is undoubtedly unjust. None the less it is true that the more systematic the precautions both to avoid the introduction of infective material from without and to prevent the retention in the uterus of material suitable for bacterial growth will largely lessen the number of such cases. It is not merely the use of soap and water and mercurial solutions that is required, but a systematic system of drill is necessary if the danger to the patient is to be reduced to a minimum. It is very easy to get clean, but it is not so easy to keep clean. The methods employed must be efficient and at the same time simple, as in cases where the attendant is single-handed, if not simple, they will be discarded altogether.

Rigid precautions against the introduction of infective material during an ordinary examination or during the course of any operative interference, is the keynote to all the measures

adopted at London lying-in hospitals. The methods adopted at such institutions may vary a little in detail but in spirit are identical. All patients are given a bath previous to delivery, unless they arrive so far advanced in labour as to make it impossible. The vulva is cleansed and frequently bathed with an antiseptic lotion, and the number of vaginal examinations made is limited as far as practicable. In hospitals where pupils are trained such examinations cannot be altogether dispensed with, though special stress is now laid upon the value and importance of abdominal examination and diagnosis.

The chemical antiseptic used for the disinfection of the hands varies somewhat, but most if not all the London lying-in hospitals still place special reliance on a solution of perchloride of mercury, and it is the stock lotion used for this purpose at Queen Charlotte's Hospital. Lysol is used for instruments. At Queen Charlotte's Hospital vaseline is employed as a lubricant when one is necessary, the pot containing it being immersed in a basin of perchloride lotion so as to prevent the access of dust. Pupils and nurses are carefully supervised during the course of a labour to see that the instructions as to cleanliness are carried out to the letter. The following printed list of the rules to be observed are hung in a prominent place in each labour ward at Queen Charlotte's Hospital :—

1. Keep the nails short and remove all rings. Turn up the sleeves.
2. Wash the hands thoroughly in soap and water, and scrub with a nail-brush.
3. Rinse the hands in clean water, but do not dry them with a towel.
4. Immerse the hands immediately in 1-1000 perchloride of mercury for one minute, at the same time scrubbing them with a nail-brush.
5. Lubricate the examining finger with vaseline immersed in 1-1000 perchloride of mercury.
6. Hold up the examining hand in order that it may not come in contact with anything until the moment for the examination arrives.
7. After the examination has been completed wash the hands thoroughly in soap and water.

After the child is born, no undue efforts are made to

accelerate the expulsion of the after-birth. A douche is not given as a routine practice, but is generally employed if the labour has been instrumental. In such cases a quart of 1–4000 perchloride of mercury is given followed by a pint of plain hot water.

Perineal and other tears are carefully sutured.

There is little doubt that the period when infection is most likely to occur is during labour. After the patient has left the labour ward the chances of infection are but slight. Well ventilated lying-in wards are no doubt advantageous, but no amount of care afterwards can make up for want of care during labour. At Queen Charlotte's Hospital the wards are for the most part small, holding from two to six patients. It has been a long standing practice to disinfect each ward at frequent intervals by sulphur fumigation and this is still done. By distributing patients in a series of small wards, the difficulty of nursing is increased, but on the other hand greater quiet can be obtained. Originally the idea no doubt was, that, by nursing patients in small wards, the spread of an outbreak of puerperal fever was limited.

In the future, however, it is probable that the wards of a lying-in hospital will be built on the same plan as an ordinary surgical ward in a general hospital.

The health of a lying-in hospital is best tested by the smallness of the percentage of febrile cases which occur among its inmates.

Slight rises of temperature due to mild sapræmia are not infrequent and probably are hardly to be avoided, but they seem somewhat more common when the hospital is crowded than when the number of cases is less numerous. At all lying-in hospitals the work varies greatly in amount from time to time. In spite of this fact the occurrence of a case of acute septic infection at such a lying-in hospital as Queen Charlotte's is almost unknown at the present day.

The more firmly all those who have to attend on such patients are imbued with the modern surgical spirit, the safer and healthier will such hospitals become.

ASEPSIS IN THE ROTUNDA HOSPITAL, DUBLIN,

By E. HASTINGS TWEEDY, *Master*.

IT is necessary before entering on a review of the aseptic methods practised in the Rotunda Hospital to furnish a short description of the hospital itself, so as to enable those interested in the subject to form an estimate of the resources at the disposal of those who have the administration of this very old and important charity.

The hospital was erected in the year 1756, and in the hundred and fifty years that have elapsed since that date, it has structurally undergone little or no change.

It is a three-storied building, massively constructed of granite blocks, and possesses many architectural beauties. The ground floor is occupied by offices, nurses' dining hall, Master's and assistant master's apartments, &c., while the upper two stories are in chief part given up to maternity wards; of these there are eight, four on each landing, as well as four small isolation rooms. Large old-fashioned windows well provide for the hospital in respect to light and air, while to supplement these, circular gratings of wrought iron are placed over large apertures situate in the centre of each corridor; thus an up-current is carried from a large and airy hall through the building, to be finally conveyed by means of an air shaft from the hospital through the roof.

A ward on either corridor has been divided into two, and the inner one of each of these is fitted with all the requirements of an aseptic, though inexpensive, delivery room. The outer compartments are used as waiting wards for women in an early stage of labour; until labour has begun no normal case is admitted into the hospital, but once in labour, any poor woman can enter either during day or night, without being asked to show a letter of recommendation, or admission form.

On admission, the woman obtains a bed-card which is filled in with certain necessary details of her history, and, if time then permits of it, she is given a warm bath, this including a very thorough washing and combing of the hair. The bathrooms,

lavatories and lift are all situate in the new gynæcological wing of the hospital, erected some ten years ago, mainly through the exertions of Dr. W. J. Smyly, the then Master, to whose energies and ability we owe this and many other structural and administrative improvements.

The second stage of labour having commenced, the patient is placed on one of the couches in the delivery ward, and is taken charge of by a nurse and a student, or by two nurses. They palpate the abdomen, and write on the bed-card their diagnoses. We find that this method procures more accurate results (and is easier to acquire) than those obtained by the vaginal examination ; moreover, it is free from the danger to the patient attending the latter procedure.

As ours is a teaching institution, however, vaginal examination is not neglected, and so permission is given to examine a woman four times throughout her entire labour ; after each of these the diagnoses arrived at must be written on the card.

Before making an examination, the hands must be washed for four and a half minutes in a lift-up basin, to which hot and cold water is supplied by means of foot pedals ; rinsed free from soap, they are then immersed in a 1 in 500 corrosive sublimate solution for a minute and a half, accurately timed by a sand glass placed on the wall.

There are certainly more efficient methods of disinfection than this, but I hesitate to employ them because of the great increase in expense that would be entailed by their use.

Safety, however, is obtained by other means, *viz.*, the provision of rubber finger-stalls; these are boiled immediately before being used, and no examination is permitted without their employment; moreover, all our operations are now undertaken with rubber gloves on the hands, and we believe that marked benefit has followed their use.

The vulva is washed by the nurse with soap and water, swabbed with aseptic tow wrung out of antiseptic solution ; antiseptic tow is also placed between the labia, while the hands are being washed, to mitigate the danger of infecting the vagina with germs carried in from the vulva by the examining finger. It is hardly necessary to mention that all instruments required are boiled in soda solution immediately before being used. Great attention is paid to the repair of lacerations to

the perineum, tears of half an inch being accounted of sufficient importance to stitch.

Normal deliveries are neither douched before, after, or during labour, nor is the placenta interfered with until the uterus by its unaided efforts has expelled it into the vagina. It is then expressed into a basin placed between the legs, a diaper is taken from a solution of corrosive sublimate in which it has remained for many hours, and placed whilst wet over the vulva ; a binder is applied, and the patient having been lifted on to a trolley, is wheeled in to the convalescent ward.

These wards are filled up with and emptied of patients in rotation ; in this way we endeavour to provide that the ward last emptied will remain so for a few days in order that it be thoroughly cleansed, aired, and disinfected with formalin vapour.

Each bed is numbered with a number corresponding to one painted on the wall, and neither it nor anything appertaining to that bed is permitted to be placed under any number other than its own. Thus the hand-basin, buttock-basin, mackintoshes, and night-chamber are all numbered, the result being that we now can control the spread of infection in a more complete manner than formerly, should occasion arise.

Until recently it was the custom to remove all diapers from the patient at the end of twenty-four hours, and to permit her to drain on to a draw-sheet for the remainder of her stay in hospital ; we have changed this now, and instead apply sheets of Gamgee tissue rendered sterile by being well scorched at the fire immediately before use. These replace the wet diaper about two hours after delivery, and, if not safer than the older plan, at least have the advantage of procuring greater comfort for the patient, and a greater degree of cleanliness in respect to the bed-linen.

One nurse has charge of three patients and their respective babies ; her duties entail the thorough cleansing of the genitals night and morning. To carry out this a buttock-pan (special design) is placed beneath the patient, who is thoroughly washed with soap and water by means of sterile wipes, carried in a direction from the pubes towards the anus, the wipe being neither permitted to touch the soap or antiseptic solution after

it has been applied to the skin, but thrown into the pan, and replaced by a fresh wipe. When all soap has been removed corrosive-sublimate solution 1 in 1000 is used in a similar manner, and the buttocks are then dried by a towel kept exclusively for this purpose, and renewed daily for each patient, the actual genitals not being permitted to be touched by this towel.

In the event of high temperature, or other symptoms of morbidity occurring, a forceps is employed by the nurse in holding the wipes which wash and disinfect the patient, a precaution which makes the nurse much less liable to spread infection.

It is now necessary to say a few words in description of our methods of sterilising trays, basins, and other utensils employed in the labour ward.

We are not possessed of means for obtaining disinfection of bulky articles by low-pressure steam; in the delivery room it would be very expensive and nearly impracticable to keep the large number of basins and trays continually required in a sufficiently clean state and ready at a moment's notice by a gas-boiling apparatus, and, accordingly, we have adopted the expedient of submerging them in a porcelain tank, in which 12 gallons of 1 in 6,000 biniodide of mercury solution is placed; in this they remain day and night, protected from dust particles by a closely fitting cover, if not required for use. When wanted, they are raised from the solution and placed in an unwiped condition on to the instrument table, and before being again replaced in the solution, they are thoroughly well scrubbed. This bath remains unchanged till labour moves to the other corridor, then all mackintoshes belonging to the room are placed in the trough, and kept soaking there for 24 hours. At the expiration of this period the tank stopper is removed, and the entire fluid is permitted to flow over the cement floor.

A thorough scalding with hot water cleanses the trough, and it is left empty till this labour ward again reopens in its turn, as already mentioned.

Bed-chambers, buttock-pans, and hand-basins are cleansed and disinfected with antiseptic solution before and after use, experience having nevertheless taught us that this is not at all times reliable in procuring sterilisation, more especially of the

outside of the vessel, and a consequent danger arises that a re-infection of sheets might possibly occur from the contamination of an infected bed-chamber. We now systematically boil all these immediately the patient has left and before a new occupant of the bed arrives.

In estimating the extent of our morbidity, an arbitrary temperature of 100·8° F. has been for years considered by us as the highest limit of normal temperature throughout the puerperium.

It has been proved abundantly during the last year that as an indication of morbidity this is entirely unreliable, and if strictly adhered to in practice would lead to unjustifiable delay in our efforts to abort the septic condition. We now consider a temperature rising after the first 24 hours and remaining above 99° F. for two consecutive days as an indication of morbidity, provided it is accompanied by a pulse-rate of over 89 per minute. If temperature and pulse rise markedly, we do not wait for the two-day indication.

Our morbidity table shows an apparent increase in consequence of this departure, but it works altogether for the advantage of the patient.

When signs of sepsis develop the woman is carefully examined for an ascertainable cause; if suspicion is directed to the parturient canal, a vaginal douche is administered (a culture for microscopical examination having been first taken), and a purgative being administered, the patient's bed is raised on blocks to promote free drainage. If symptoms persist on the following day, the vagina is again douched out, a Ferguson's speculum inserted, and the cervix wiped dry with sterile wool, then a sterile glass tube suitably curved is passed into the uterus, and its contents are aspirated into the tube, by means of an affixed syringe. The tube is next closed by sealing wax at either end, and sent down to the pathological department for bacteriological examination and report of its contents. The uterus is now douched with salt and water, peroxide of hydrogen, or cyllin solution according to the predilection of that assistant-master whose duty it may be to perform the operation.

If symptoms have not abated within 24 hours, the patient is removed, with her mattress and all her belongings, to a small

isolation ward, where she is taken charge of by a special nurse, and the uterus is again douched. If the bacteriological report has been productive of positive results, the inside of the uterus is explored by means of a gloved forefinger in order that pieces of retained placenta, membranes, or old blood clot may be removed if present.

For our bacteriological laboratory and its fittings, we are indebted to my predecessor, Dr. Dancer Purefoy, who generously presented it to the hospital at a personal cost of 300*l.*

There is nothing more remarkable in the history of the Rotunda Hospital than the steady and rapid increase of deliveries which has taken place within the last 10 years.

The increase now amounts to nearly 500 per annum in the intern maternity alone; 205 women were delivered in the wards of the hospital during the month of May last year, and it can easily be understood how difficult the task became of attending in an aseptic manner so large a number of women.

The authorities of the hospital, acting with commendable foresight, have determined on a scheme to enlarge the hospital, so as to still further ensure the safety of our patients.

There are many points in this brief narration of our aseptic methods that may strike those reading this paper as cumbrous, or perhaps altogether unnecessary. My reply to such criticism is that each step described has been necessitated and evolved gradually in the systematic stamping out of serious morbidity.

Our claim to public recognition is, not that we are superior in asepsis to other well-managed institutions, but rather that we carry out our two great objects, the charity of a maternity and gynæcological hospital, and of an important teaching centre, in a satisfactory and uniquely economical manner.

PUERPERAL FEVER AND THE CONTROL OF MIDWIVES.

By CHARLES E. PAGET,

Medical Officer of Health to the Northamptonshire County Council.

AMONG the fevers defined as infectious diseases enumerated in the Infectious Disease (Notification) Act, 1889, is that known by the name of "puerperal." The purpose of "notification" of a case of puerperal fever is that measures may be taken by the local authority in whose district it occurs to prevent infection being carried from it to another woman lying in childbirth. Such measures may be required in the case of a medical attendant or a nurse, or both, or of a midwife : they have never been defined specifically in any Act of Parliament, and vary in their application according to the opinion and advice of the local medical officer of health. The liability to see that precautionary measures are taken rests with the local authority and its officers ; the efficiency of the measures depends upon their interpretation of their responsibility.

Puerperal fever does not in this country commonly occur in epidemic form ; but a more or less regular percentage of cases is recorded annually. A very instructive map in this connection has been recently prepared by Dr. W. Williams, Medical Officer of Health to the Glamorganshire County Council, to illustrate his Milroy Lectures in the year 1904 on "Deaths in Childbed : a Preventable Mortality." In those lectures he showed that the death-rate per 1,000 registered births from puerperal septic diseases ranged from 3·0 to 1·4 in the various counties of England and Wales for the twenty years, 1881–1900. The mortality is sufficiently important for strong efforts to be made to reduce it. The rate of mortality is, however, probably not indicative of a uniform amount of puerperal septic sickness, for all women who suffer from puerperal fever do not die ; but it is certain that the proportion of such sickness among lying-in women is much greater than it need be.

Apart altogether from the fact that precautions are now

more commonly taken by medical practitioners and trained monthly nurses to ensure that they shall be neither the active exciters nor transmitters of the infection of puerperal septic sickness, it has been estimated that 60 per cent., and in poor districts an even larger proportion, of births in England and Wales are attended by women acting as midwives. Great as has been the attention which has been paid to this subject during recent years, and the encouragement given to the efficient training of women to fit them to act as practitioners of midwifery, it cannot be said that the standard of midwives has been very appreciably raised—particularly in the more rural districts of the country. A well-educated and well-trained midwife is a person of the highest possible value, and women of that stamp have for long done work of the most beneficial kind ; but it must be admitted that in many parts of the country the practice of midwifery by a large proportion of women has been based rather on tradition than on scientific training, with anything but good results to their individual patients or the general community. The precautions which are necessary in the case of the medical practitioner, when attending a parturient woman, are at least as essential in the case of a midwife. The more general use of antiseptics has been urged over and over again by expert obstetricians, and the individual responsibility of the practitioner is emphasised in most medical schools to a greater degree than was formerly the case.

But the midwife until now has been under no legal obligation to make herself fit to undertake the care of parturient women in the absence of a medical practitioner. The passing of the Midwives Act, 1902, has altered this condition of things, and brings her in due course under effective supervision. The Act does not indeed make provision for the *training* of midwives, and it is probable that the future supply of such trained women must depend upon voluntary or rate-aided support, during the period of training, for there are many women who, with the promise of making excellent midwives, would be too poor to finance themselves. But the Act does provide for the supervision of the midwives, for regular inspection of the appliances of their calling, and watchfulness over their method of practice, and it is just through this supervision that hopes

are entertained for a reduction hereafter in the amounts of puerperal septic sickness and mortality.

The Central Midwives Board, constituted under the Act, have, after due deliberation, drawn up a set of rules which have received the approval of the Privy Council for a period of three years from August 12, 1903. The duty of seeing that these rules are carried out is placed on the councils of county boroughs, and on county councils. This fact represents a new departure in the development of public 'health legislation, and one which has been greatly needed for some time. The Public Health Acts have hitherto been generally administered by the councils of all boroughs—in county or non-county—and urban and rural districts, with the exception of the Isolation Hospitals Act of 1893. In some instances the county councils have been given special powers of action in default by district councils, and, in the case of rivers pollution, concurrent powers. But, in regard to the control of midwives, county councils have been selected for holding the executive powers under the Act, though with permission to delegate their duties to the district councils. It is a matter for congratulation that the county councils have, so far as can be at present ascertained, mostly decided to retain these powers in their own hands. Out of 61 county councils in England and Wales, only 7 have wholly delegated their powers to the district councils, and one partially so, while 6 other councils have not yet finally come to a decision on the point. It may, therefore, be taken as certain that the supervision of midwives in most of the counties of England and Wales will not be carried out in a perfunctory manner.

With regard to the method of supervision itself, it is unfortunate that a certain proportion of county councils have hitherto refrained from exercising their power under the Local Government Act, 1888, to appoint a county medical officer of health. In those counties where such an officer has been appointed to give his whole-time services, the scheme of supervision should present few difficulties. But in others, which have neglected to do so, it is apparent that, in default of skilled medical advisers being secured, the supervision of midwives in those counties can hardly be carried on in a satisfactory manner. The Central Midwives Board, recognising

the importance of the subject, have accordingly issued the following series of suggestions to county councils for their guidance in regard to the matter of establishing more or less uniform systems of supervision :—

" 1. The Central Midwives Board suggests to the county councils the advisability of retaining the administrative duties assigned to them under the Midwives Act, 1902, as far as possible in the hands of a committee directly appointed by themselves. This will not only secure for the county council more adequate control over the expenditure, but will tend also to prevent the possibility of local rivalries and jealousies interfering with the carrying out of the provisions of the Act.

" 2. The Board suggests further that the health committee of the county council would form a suitable committee to act as the local supervising authority, with power to add to its number from outside the council or otherwise.

" In counties where there is no county medical officer, it is suggested that a special medical officer be appointed to advise the committee.

" 3. It is further suggested that supervision should be regarded as at least in part a medical duty, and that the medical officer of health, or the medical adviser specially appointed, should be empowered to act as the executive officer of the committee.

" 4. The Board suggests to county and county borough councils that, this being a matter almost solely affecting women, the local supervising authority should, as sanctioned by the Act, include in any committee it may appoint one or more women conversant with the needs of the poor in the district."

It appears from a Return to an Order of the House of Commons, which was ordered to be printed the 8th of August, 1904, that 24 county councils in England, and 11 in Wales, had still failed to appoint a county medical officer of health, and that, even in the appointments which had been made, all the officers had not been required to devote the whole of their time to the service of the councils appointing them. In those counties, however, where a medical officer of health has been

appointed, he has as a rule been required to undertake the inspection of midwives, their appliances, and the manner in which they perform their duties. In 9 of the counties of England and Wales it appears that already assistance is being given the medical officers of health, for the purposes of such inspections, by the appointment of a female inspector of midwives, and the lead in that direction was given, it is believed, by the county council of Northamptonshire. In 7 other counties it is likely that similar appointments will be made. The qualifications required of the inspector in the County of Northampton are that she shall be a fully-trained nurse and a midwife certified by the Central Midwives Board, or qualified to be so certified. The appointment was ordered to be made by a resolution of the county council on 14th of January, 1904, and has proved a most useful one. The inspector acts under the direction of the medical officer of health, and the following are her chief instructions :—

" 1. To inspect the case-book of each midwife to see if it is properly entered up.

" 2. To inspect bag of appliances of midwife as to—

" (*a*) Antiseptic washes,

" (*b*) Antiseptic lubricants, and

" (*c*) Cleanliness or otherwise of instruments.

" 3. To report as to personal cleanliness of midwife.

" 4. To report as to cleanliness and sanitary condition of midwife's place of residence.

" 5. To see that midwife has suitable washable dresses for use only in her practice.

" 6. To exercise an educational influence on such of the midwives as are in need of improvement.

" 7. To carry out such routine correspondence in connection with the general supervision of midwives as the county medical officer of health may direct.

" 8. To report on any case of malpractice, negligence, or misconduct on the part of any midwife as the county medical officer of health may direct or she herself may become aware of."

It is thus plain that, for the purpose of supervision of the midwives, the powers in the hands of county councils are

already ample for dealing with the matter on lines which shall
not only be efficient in the provision of official medical control,
but also in the direction of securing regular and systematic
visitation by a person quite familiar with the practice of mid-
wives. The supervision of midwives cannot be satisfactorily
performed by perfunctory visits; moreover, however much the
practice of midwives requires watching in the interests of their
patients, their supervision ought to have the effect of being
helpful to themselves, instead of obstructive, especially in
the poor districts of towns and the more rural districts of
counties. A fully-trained nurse and midwife — particularly
one who has had good experience in district nursing — is
probably the best fitted and most acceptable person for the
general performance of such duties, provided that she has
skilled medical opinion to fall back upon for advice and
special visitations.

With such machinery, it may be hoped that much may be
done towards reducing the amounts of puerperal septic sickness
and mortality. An initial difficulty, in laying the foundations
for the due administration of the Midwives Act by local super-
vising authorities, has been that of ascertaining the names of all
women who have habitually and for gain, or casually, been in
practice as midwives; but the list was made up in Northamp-
tonshire through the courteous response to circulars sent to
all medical practitioners in the county, and from information
supplied by the county police and others. Doubtless in other
counties a similar course was followed. A succeeding difficulty
was presented by the indifference or illiterateness of many
of the women to whom circular letters were addressed in
explanation of the effect of the Act on them and their calling.
This was most successfully overcome in Northamptonshire by
the personal visit and interview of the inspector with each
of the 403 women on the county list, above one half of
whom thereupon decided to relinquish their calling on various
grounds, such as old age, impaired health, want of education,
and reluctance to place themselves under such simple super-
vision as would ensure that they kept washable dresses, proper
bags and appliances, and record-books of their practice.
Similar instructive figures in this connection have been given
by Miss Wilson, President of the Incorporated Midwives'

Institute, in a pamphlet, dated October, 1904, on " The Training of Midwives, and the Organisation of their Work in Rural Districts." In respect of 21 county council returns it is stated that " out of 10,333 midwives practising, 2,682 are up to the present certified ; and although additional names will be added before April, 1905, it is clear that there will be a considerable diminution in numbers." The significance of these figures is great as to the need of maintaining the required supply of midwives where they may be in demand ; but they are equally important as indicating a very greatly reduced risk in the future of the causation and propagation of puerperal septic sickness by irresponsible and unfit female practitioners of midwifery. The latter is no mean gain, and, with indifferent women retiring from practice, and the necessity for speedily training others to take some proportion of the places eventually vacated by them, at least one of the intended purposes of the Midwives Act has already been achieved.

How necessary the inspection of even certified midwives is may be very easily shown. It is assumed that the provisions of the Midwives Act are known and understood in connection with the enrolment of midwives by the Central Midwives Board, namely, that women, other than those holding qualifying certificates for obstetrical practice, are eligible to be certified as midwives who have been in *bonâ fide* practice for one year before July 31, 1902, and are certified to be trustworthy, sober, and of good moral character, from personal knowledge, by a justice of the peace, minister of religion, registered medical practitioner, or other person acceptable to the Central Midwives Board. In Northamptonshire, and most probably in other similar counties, the total number of midwives already holding certificates of proficiency in obstetrics was relatively very small, and the bulk of the certified midwives to the present time consists of women who had been in *bonâ fide* practice, but had undergone no special training in a recognised institution. The number is not yet complete, as applications for enrolment by the Central Midwives Board may still be made before April, 1905. But, in Northamptonshire, by the end of October, 1904, sufficient information was available to show how important the necessity for inspection was. The certified midwives were, indeed, found to be very unequally provided with the materials

for complying with the rules of the Central Midwives Board, as may be seen from the following table :—

No. of Certified Midwives.	Certified Midwives in Possession of				
	Case Book.	Record Book.	Washable Dresses.	Bags.	Appliances.
30	30	30	30	30	30
4	4	4	—	4	4
1	1	1	1	—	1
5	5	5	5	—	—
2	2	2	—	2	—
1	1	—	1	1	1
1	1	1	—	—	—
4	—	—	4	4	4
4	—	—	4	—	4
6	—	—	6	—	—
7	—	—	—	—	—
65	44	43	51	41	44

From the foregoing tabulation it may be gathered that the proportion of certified midwives who will be likely to be found on inspection to be, in the first instance, efficiently fitted out for their calling will be relatively small. The visits of an inspector may be expected to bring about a satisfactory change. In some instances it will be found that the appliances are not in a fit state for further use or up to the standard of modern practice ; considerable differences will also be noticeable in respect of the kind and quality of disinfectants used, and in the keeping of finger nails short and clean. A point to which attention will also have to be given, in connection with the prevention of puerperal fever, is in regard to the efficient cleansing and disinfecting of a midwife's appliances. The appliances named in the rules of the Central Midwives Board are, with the exception of the clinical thermometer, such as can be supplied in forms that will not suffer damage by being *boiled*, and this is important, as there is no other simple and ready method than that of boiling for securing the satisfactory cleanliness of such appliances in the case of many of the midwives.

There are several features in the rules of the Central Midwives Board of public health interest which indirectly

give considerable influence to county councils as local
supervising authorities beyond the immediate scope of the
Midwives Act. One is in regard to the inspection of the
places of residence of midwives. It is undoubtedly important,
for the purpose of checking the occurrence of puerperal septic
sickness, that the midwife should not proceed to attendance
on a case of child-birth from an habitually dirty and ill-kept
dwelling, and proper inspections of her residence may be
expected not merely to keep her from allowing it to become
dirty, but also to act as a lever for the enforcement by the
local district council of sanitary requirements and repairs.
Many of the smaller urban, and even large rural, district
councils are notoriously lax in the exercise of their powers of
inspections of dwellings under the Public Health Acts ; their
inspector of nuisances is far too often also their district surveyor,
from so-called motives of economy, and infrequently a properly
qualified sanitary official ; in rural districts particularly there has
arisen, in no small degree through negligence, an insufficiency of
habitable cottage property, and therefore difficulty in the choice
of a dwelling ; and the profits from the practice of a midwife,
except in special circumstances in towns, do not usually afford
her an independency. It is easily conceivable, therefore, that
"an inspection of her place of residence," as provided for in
the rules of the Central Midwives Board, by an independent
authority, such as the county council, and the pressure
which may be brought to bear by that body, may be of far-
reaching value.

Again, section E., clause 5, of the rules of the Central
Midwives Board reads as follows :—" Whenever a midwife has
been in attendance upon a patient suffering from puerperal
fever, or from any other illness supposed to be infectious,
she must disinfect herself and all her instruments and other
appliances, to the satisfaction of the local sanitary authority,
and must have her clothing thoroughly disinfected before
going to another labour. Unless otherwise directed by the
local supervising authority, all washable clothing should be
boiled, and other clothing should be sent to be stoved (by the
local sanitary authority), and then exposed freely to the open
air for several days." By this clause the local district council
is made directly responsible for two things, independently of or

in addition to the local supervising authority, on general grounds
of public health.   It is specifically the duty of the local sanitary
officials to take action to assure themselves against the spread
of infection in their district by a midwife as in the case of any
other person, and it is the duty of their council to provide
them with a proper disinfecting apparatus for the non-washable
clothing of the midwife in particular, and other persons
generally.   But the provision of this disinfecting apparatus
has been in the past more honoured in the breach than the
observance, and it remains to be seen to what extent its
provision under pressure by local supervising authorities under
the Midwives Act, 1902, may be secured.   In this connection
it is worth remembering that the rules of the Central Midwives
Board were approved by the Privy Council for a period of three
years only from August, 1903, and it is reasonable to suppose
that this limitation was in part made for the purpose of
ascertaining the extent of the sufficiency of the rules for giving
proper effect to the provisions of the Midwives Act.   In the
event of it being found on inquiry that local sanitary autho-
rities are still greatly in default in the matter of making proper
provision for the stoving of infected clothing, it is to be hoped
that power will be given to county councils to require the pro-
vision of suitable disinfecting apparatus, and to supply the same
at the cost of the local sanitary authorities in case of their
default after due notice.   Something more than control over
the spread of puerperal septic sickness would be gained thereby.

The circumstances under which a midwife is required to
send for medical aid are clearly set forth in the rules of the
Central Midwives Board, and she is also under obligation to
make notification to the local supervising authority of the
death of a mother or child, occurring in her practice before the
attendance of a medical man, of a stillbirth when a medical
practitioner is not in attendance, and of any case of puerperal
fever or other infectious disease occurring among her patients.
The record of having sent for medical assistance, and of
notification, must be made by the midwife in writing to the
local supervising authority and be sent by post within 12 hours
of the occurrence or diagnosis.   The notification of puerperal
fever and other infectious diseases to the local supervising
authority is independent of, and in addition to, that notification

to the local sanitary authority which is obligatory under the Infectious Disease Notification Acts. It will, therefore, commonly happen, particularly in rural districts situated at some distance from the central offices of the local supervising authority—assuming that this is the county council—that the knowledge of the occurrence of a case of puerperal fever will reach the district medical officer of health some hours before it does the county medical officer of health or other medical adviser. The local medical officer of health will thus at least have usually had an earlier opportunity of inquiring into the circumstances of a case of puerperal fever before either the executive officer of the local supervising authority or his inspector could get to it by rail or otherwise, even if one or both of them had not to put off engagements in other parts of the county to do so. It is a matter of no small importance to a midwife that there should be no delay in an immediate inquiry and report on the circumstances of a case of puerperal fever occurring in her practice, for she may be absolutely blameless ; the evidence in her favour, however, might be less satisfactorily acquired after a lapse of some days, in the event of her having to repel an accusation laid against her before the local supervising authority. Some scheme, therefore, is needed whereby the main facts of a case of puerperal fever may be recorded, with the least possible delay, in a formal and precise manner by a skilled person. The scheme should not be difficult of accomplishment, and such an one is already working satisfactorily. The originator is Dr. Barwise, the County Medical Officer of Health for Derbyshire, and the scheme has been adopted in Northamptonshire with excellent results. It amounts to nothing more than securing a definite report from the district medical officer of health to the local supervising authority. This officer has to report to his district council on the occurrence of notifiable infectious diseases coming to his knowledge within his district ; he is, however, under no obligation to report similarly to the county council Nevertheless, he is the best person to supply the information without delay, and, to recompense him in a slight degree for such a service to the local supervising authority, the Derbyshire and Northamptonshire — and possibly other — County Councils have already arranged to pay half a guinea for a

report by a district medical officer of health on the circumstances of each case of puerperal fever notified to him as occurring in the practice of midwives within his district. These reports are made on a double-sheet form, so as to provide sufficient space for the entries, and the particulars required are as follows :—

MIDWIVES ACT, 1902.

Report upon Case of Puerperal Fever in Practice of a Midwife.

1.—Name of Midwife _____
 Address. Parish_____ . Street_____
 Date of Inspection by M.O.H. _____
 Name of Patient _____
 Age _____ . Date of Confinement _____
 Date of Inspection of patient's residence by M.O.H. _____

2.—Please copy from Midwife's Register or otherwise obtain the following :—
 No._____
 Date of engagement to attend_____
 Name and Address _____
 Number of previous labours and miscarriages _____
 _____
 Age_____
 Date and hour of Midwife's arrival _____
 Presentation_____
 Duration of 1st, 2nd, and 3rd stage of labour_____
 _____
 Complications (if any) during and after labour _____
 _____
 Sex of infant_____ . Born living or dead _____
 Full time or premature—No. of months _____
 _____
 If doctor called_____ . Name of Doctor_____
 Date of Midwife s last visit_____
 Condition of Mother then_____
 _____
 *Remarks _____
 _____

  * If any drugs have been administered state here, and their nature and dose, and the time and purpose of their administration.

3.—Does Midwife wear dress of washable ¦material and a clean washable apron ?
 _____

4.—What antiseptic washes is Midwife provided with ?_____
 _____
 Is Midwife provided with Antiseptic lubricants ?_____

5.—Are all her instruments and appliances obviously clean ?_____

_____

6.—Has the Midwife disinfected herself and her instruments to the satisfaction of your District Council ? (See Section of the Rules of the Central Midwives Board) _____

7.—Has Midwife been in attendance on any other case of
  (*a.*) Puerperal Fever_____
  (*b.*) Erysipelas_____
  (*c.*) Any other Infectious Disease _____

8.—To what cause do you attribute the case, to the best of your belief ?

_____

_____

9.—Is the Midwife, to the best of your belief, complying with the Rules of the Central Midwives Board ? State any exception_____

_____

10.—Have any circumstances come to your knowledge which make a *primâ facie* case for the investigation of the Local Supervising Authority, with the view of communicating with the Central Midwives Board?_____

_____

_____

MEDICAL OFFICER OF HEALTH.

N.B —It is understood that this Report is private and confidential, and that the County Council is solely responsible for any Report made to the Central Midwives Board.

It will be seen that this report serves a double purpose; it gives early and skilled information as to the possible implication of the midwife in relation to the case of puerperal fever, and it constitutes a record of the discharge of the responsibility of the local sanitary authority in the matter of disinfection. The expense of such a report can hardly be regarded as extravagant or unnecessary, and, in any case, will almost certainly be an annually diminishing one.

However brief this outline may be, it may at least serve to show how the powers of local governing bodies in England

and Wales may be brought to have a great influence on the prevalence and fatality of puerperal septic sickness. The Midwives Act, 1902, on which their action will be based, is a highly important one, however much it may be regarded as being incomplete ; and, though the utmost endeavours are undoubtedly necessary to secure the fullest interpretation of the rules of the Central Midwives Board in the interests of the community, it must not be supposed that those interests will involve the harassment of what should hereafter be a body of well-trained and most deserving women.

PUERPERAL SEPTICÆMIA FROM A PUBLIC HEALTH ASPECT.

By W. WILLIAMS, M.D., D.P.H. (Oxon.),

Medical Officer of Health, Glamorgan County Council.

I PROPOSE to deal in this article with puerperal septicæmia in its public health aspect.

Although puerperal septic diseases are essentially preventable, yet statistics prove conclusively that the mortality from them has not shared the diminution which has been observed in the case of other preventable diseases, such as small-pox, malaria, tuberculosis, typhus, and typhoid fevers, &c.

The Registrar-General divides deaths in childbirth into two groups :—(1) Puerperal Septic Diseases, and (2) Accidents of Childbirth ; and I propose to adhere to this division and to deal with group (1) only. Although puerperal fever has been for some years a compulsorily notifiable disease, yet unfortunately it is only from its death roll that the extent of its ravages with any degree of accuracy can be gauged, for all women who suffer from puerperal fever do not die. Deaths from puerperal septicæmia has been a dark, deep, and continuous stream of mortality running through our statistics since the commencement of registration, indeed from the most remote period, without showing any signs of abatement, and occasionally overflowing its banks with most disastrous results. That it is a mortality which is essentially preventable is proved by the enormous improvements which have of late years marked the records of lying-in institutions generally, and under other conditions where precautionary measures are strictly observed. *If preventable, why not prevented ?*

No one will contend that the annual deaths in England and Wales in these advanced days of some 2,000 mothers from puerperal septicæmia is not deplorable, and nothing should be allowed to stand in the way of those who have at heart the public health and welfare of our poorer mothers from giving this subject the attention and consideration it demands. I

have before me a table[1] giving the number of deaths in child-birth from septicæmia during each year from 1847 to 1901, a period of 55 years. What do these figures prove? They prove that we have lost from puerperal septicæmia during this period 89,572 mothers, and that this painful sacrifice has been going on steadily, but surely and unheeded, throughout England and Wales, and it has remained up to the present undiminished. Take any year for example. In 1848 there died in childbirth from septicæmia 1,365 mothers, in 1874 there died 3,108, in 1884 there died 2,468, in 1894 there died 2,167, and in 1901 there died 2,079.

Take again the figures for the last 20 years. What do these show? They show that no improvement has taken place in spite of (a) the enormous advances ·made in surgery, (b) the adoption of aseptic and antiseptic measures, (c) the reduction in mortality in lying-in hospitals and under other conditions, and (d) the improvements in sanitary matters generally.

This is a deplorable state of affairs, and what is the explana-tion of it?

It has been proved without a doubt that during recent years the mortality from puerperal septicæmia in lying-in institutions generally has decreased almost to a vanishing point, so that we are forced to the conclusion that this undiminished mortality takes place outside these institutions, that is, in general practice, and that the conditions under which women are confined outside these institutions have not shared to an equal degree the improved methods and care adopted therein.

I have searched the records of several lying-in institutions, and the figures collected prove that puerperal septicæmia has disappeared almost entirely from them. Such was not the case some 20 years ago.

Now let me briefly refer to the incidence of this mortality throughout England and Wales for the period of 20 years, 1881 to 1900. On examining the figures before me I find that the mortality has been highest in some of the Welsh, North Western, Northern, and West Riding Counties.

Why are the rates highest in these counties? Is it because medical men and midwives are less skilful than in other counties? Certainly not. The physical features, I would

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[1] *The Milroy Lectures*, 1904, " Deaths in Childbed : A Preventable Mortality."

remark, which obtain in some places within those areas often render it difficult to procure medical and skilled assistance in time. This remark applies specially to the sparsely-populated and mountainous counties in certain parts of Wales. Take again some of our large towns, industrial and mining centres ; here the rates of mortality from puerperal septicæmia vary enormously and are difficult to explain.

Why is it, then, that the mortality from puerperal septicæmia is so high in the places mentioned ?

Is it because the midwives who attend the majority of cases in these districts are ignorant and unskilled in their work ? is it because aseptic and antiseptic precautions are not rigidly observed in general practice ? or is it unnecessary interference with the natural course of labour ? I unhesitatingly answer and can prove that midwives have played a very important part in the causation of this sustained high mortality. The untrained and unskilled of them (and in Glamorgan about 1 out of every 10, or 10 per cent., only are trained) have no knowledge whatever of the true meaning and application of aseptic and antiseptic measures, and are unable to diagnose dangers, and consequently have no idea when to send for medical assistance, and often do so when it is too late. The percentage of confinements attended by midwives in some colliery districts is as high as 80 per cent. Just think of the mischief that can be brought about, and is brought about, by these unskilled midwives ; but be it far from me to malign them, for I know that the majority of them do their best, and that it is not their fault that they are unskilled. Whose fault is it then ? It is not that of the midwives, but our own ! !

How can the dangers of childbearing be alleviated ? This question was asked over a century ago (and it is also asked now), and the answer was, by the establishment of maternity hospitals ; for what seemed more likely to be the means of saving those women in travail from peril than the maternity.

Unfortunately, in a very few years, experience proved that the assemblage of childbearing women under the one roof and under conditions there existing gave rise to fatal epidemics of childbirth fever, and the mortality was almost invariably in excess of the mortality in detached dwellings. Indeed the mortality in some instances became excessive, and in other

instances appalling, and the inscription, "Lasciate ogni speranza voi ch' entrate" (" All hope abandon ye who enter here"), would have been as appropriate over their open doors as it was over the gloomy underworld of the Italian poet.

Seeing how disastrous some of these epidemics were, some medical men at once came to the conclusion that no help was to be expected from maternities; others, however, were more hopeful of seeing this mortality reduced by the progress of the art of obstetrics and the solution of various other problems, including a better knowledge of the mechanism of labour. Among the latter class were such pioneers as Miss Florence Nightingale, Dr. Matthews Duncan, Dr. William Farr, and others, who rendered invaluable assistance to our country. Miss Florence Nightingale (1865), having directed attention to the question of lying-in hospitals, fully realised that educated midwives, as well as physicians, were required, in order to secure the best chances of living to mother and child, and the account which she gives of her experience at the two camp hospitals of Shorncliffe and Colchester is excellent.

In the earlier years of Queen Charlotte and the General Lying-in Hospitals, London, and up to 1880 or thereabouts, the mortality from septicæmia in these and similar institutions were excessive and occasionally appalling, but of late years it has disappeared almost to a vanishing point, and that through the observance of aseptic and antiseptic precautions. This is no mere statement, for I have had the records of these institutions searched, and it should be borne in mind that it is the worst cases from the poorest and most overcrowded districts that seek the assistance, attendance, and nursing offered by the in- and out-door departments of these institutions.

We want something more than lying-in institutions, for all our poorer mothers cannot be confined there. We require trained midwives who know when to call in medical aid.

Again, the study of epidemic puerperal fever leads us to the conclusion that puerperal septicæmia is (1) highly infectious, (2) carried from person to person by midwives and others. Hence the great importance that local supervising authorities should insist upon local sanitary authorities carrying out the prompt and thorough disinfection of midwives, their apparel and instruments, after being in attendance upon a case of

puerperal fever and other infectious diseases—a duty which is imposed upon them by the rules of the Central Midwives Board (E. 5). I attach a great deal of importance to thorough disinfection as a means of preventing the spread of puerperal fever.

Epidemic puerperal fever prevailed at Thasos at the time of Hippocrates. The accounts given of the following epidemics are well known, namely :—The Epidemic at Hôtel Dieu, Paris, where scarcely a patient escaped. The Aberdeen Epidemic (1779–1882) by Gordon, who said : " This disease seized only such women as were delivered or visited by a practitioner, or taken care of by a nurse who had previously attended persons with the disease." The Leeds and Vicinity epidemic (1809–1812) by William Hey. The Epidemic in Northumberland and Durham (1813–1814) by Armstrong, who observed : " It is a singular fact that in whatever place the fever occurred it was principally limited to the practice of one accoucheur in the place." The prevalence of puerperal fever at the General Lying-in Hospital, London, by Ferguson (1839). Here 68, or one-third, out of 205 attacked, died. These accounts show that the disease is (1) a very fatal one, (2) a very infectious one, and (3) that it is easily carried from patient to patient by those in attendance. It would be interesting to give other instances, but they all point in the same direction, and should serve to impress upon us that the question of personal responsibility cannot be too strongly urged upon midwives and medical men alike.

My experience of puerperal fever extends back some 14 or 15 years, and I have witnessed some heartrending cases and investigated several epidemics.

I know one valley where puerperal fever was epidemic for years, and where the population was only a few thousands ; in four years 67 cases of puerperal fever occurred resulting in 26 deaths, or 38 per cent. In the same place, during a period of 11 months, 18 cases occurred ; 8 were fatal, and 7 were in primiparæ ; 9 were attended by the same midwife, and of these 3 proved fatal. Again, out of 11 cases in the adjoining valley, 6 were primiparæ, and 4 died ; of these 4 were attended by the same midwife. A notable feature of one epidemic I investigated was that *all* the fatal cases were attended by one and the same midwife. Do not these facts conclusively demon-

strate the part played by midwives in spreading the disease ? Medical aid was not sought until it was too late, and the midwives were absolutely unskilled and ignorant.

Once I came across a midwife in attendance upon a case of puerperal fever, and when asked why she was lame, she answered that she had an ulcer on her leg, and it was a large erysipelatous ulcer which she dressed herself. I came across five cases of puerperal fever which were traced to two females who had been engaged in laying out and ornamenting the cadavera of persons who had died from infectious maladies. I could adduce other and similar instances in abundance, but it is unnecessary and tedious.

I need not dwell on the history of the various attempts and struggles which have resulted in the Midwives Act, 1902. Before the time of Henry VIII. the medical profession was controlled by the Church, and Bishops licensed physicians, surgeons, apothecaries, and midwives alike, but when the Faculty began to manage these matters, midwives were ignored. We now have an Act of Parliament which we should have had years ago were it not for the lack of interest in a question of such national importance.

The objects of this Act are to secure the better training of midwives and to regulate their practice, its ultimate objects being the saving of mothers' and children's lives during childbirth. The Act makes no provisions whatever for the training and supply of midwives, and it is hoped that this will be taken up by county councils and supplemented where necessary by public endeavour and private philanthropy. Several associations have already been started for the training and supply of midwives such as the Association for Promoting the Training and Supply of Midwives, and the Rural Midwives' Association. In certain places abroad the training is more thorough and is given practically free by the State or the community ; the supply of candidates here, therefore, presents no difficulty, and a small but fixed salary is guaranteed to midwives in thinly-populated and remote districts, and preference is given to pupils who intend to practise among the poor.

Will the new Act improve matters ? Yes, to a great extent, but the improvement will be a very gradual one even in areas where every attempt is made to administer its provisions, and

it is quite certain that effectual supervision and the successful operation of the Act must in a great measure depend upon the co-operation and assistance of the medical men practising within the area affected by it. The work of securing the better training of midwives will be far more difficult than the work of supervising and regulating their practice. I think, however, that it may be taken for granted that the Act will be satisfactorily administered in all counties and county boroughs that have appointed medical officers of health who are not in private practice. I am glad to be able to state that the Glamorgan County Council have decided to contribute annually the sum of £100 to the Medical Department of the University College, Cardiff, towards establishing thereat a training centre for persons who are desirous of becoming midwives, and of entering for the examination of the Central Midwives Board. A sum of £50 is also contributed annually by the Corporation of Cardiff for the same purpose. Three courses of lectures are to be delivered annually, each course lasting for thirteen weeks. The first course was commenced in October last, and I am more than pleased to state that the number attending the present course is about 40, so that we shall have in a year's time over 100, at least, trained at this centre and who will soon, I hope, possess the certificates of the Central Midwives' Board. I fear that more difficulty will be experienced with the 20 cases of confinements which each pupil must attend, but I am hopeful that this matter also, which is now under consideration in Glamorgan, will shortly be overcome. After the 1st April 1910, no woman shall be allowed to call herself a midwife or any name suggesting competence unless she has earned it by training and obtained an acknowledged certificate. We have, therefore, a period from now to the 1st April 1910 (as pointed out by Mrs. Heywood Johnstone), " to review the whole situation and prepare for the change, so that when the 'Gamp' and all her train of death, sorrow, and suffering passes from our midst, the dawn of a better state of things shall culminate in a sufficient supply of trained midwives who have been taught to care for mothers and infants, and who will be bound to call in a doctor in the case of disease and abnormality before they have drifted beyond the reach of medical skill." This is exactly what should be aimed at, but to bring it about will be found a very uphill and difficult task,

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especially in sparsely-populated rural districts. Much can be done in this direction by associations such as those already named, but personally I am very sanguine that the training of midwives will be looked upon as an important branch of technical education, and undertaken by County Education Authorities and other public bodies.

County councils and public bodies in various parts of the country are providing facilities for the technical training of women in almost every branch from cooking to music.

Training in obstetric nursing is a typical form of technical education, for it affords instruction of a kind otherwise out of the reach of those instructed, and the skill acquired might be expected to supply a local need and find local employment. This training cannot be carried out locally in places most needing it. and to be efficient it must be at some centre where, what would be the individual experience of many years, could be concentrated into a course of instruction lasting only a few weeks. In Glamorgan the county council have decided to award 21 free studentships annually and conditionally to deserving young women attending the classes already referred to. Certainly, suitable women desirous of obtaining such training should be assisted and encouraged in every possible way, and where the matter is not taken up by public bodies, here is the opportunity for private philanthropy. With regard to the work of supervision, this will become easier year by year as the quality of the supply will improve. In Glamorgan a Lady Inspector, who is a trained nurse as well as on the roll of midwives of the Central Midwives Board, has been appointed to act under the direction of the County Medical Officer and an executive sub-committee consisting of eight members of the sanitary committee. I feel convinced that the mortality from septicæmia in childbirth among the poorer classes can be very materially diminished, if they are attended by sober and intelligent women acquainted with the plain doctrines of health and possessing an elementary knowledge of midwifery, and, to use the significant and beautiful sentence penned by the late Dr. T. W. Thomson, of the Local Government Board, "such improvement can only be brought about by the full appreciation of *all* that is known of the etiology of the disease, and an adequate sense of responsibility on the part of *all* those brought into contact with the lying-in chamber."

THE PATHOLOGY OF PUERPERAL FEVERS.

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WHEN considering the causation and treatment of puerperal fevers it is obvious that we have to deal with a number of forms of disease which differ widely both in their pathology and in their clinical features, and which are grouped together merely because they comprise the immediate results of bacterial invasion of the female generative tract either during labour or during the puerperium.

Under those circumstances, it is no matter for surprise that no concise classification of puerperal fevers for clinical purposes or as a basis for treatment has been arrived at ; the classification into sapræmic, septicæmic, and pyæmic types as adopted by the older writers, and representing only a superficial view of the exact pathological conditions underlying puerperal infections, is now of little practical value, and no satisfactory improvement on it has yet been devised.

Pathologically we can attribute cases of puerperal fever to their specific causes, we can speak of a streptococcic puerperal fever, of a pneumococcic puerperal fever, and so on ; but, except in the case of streptococcic infections, it is doubtful whether the more exact knowledge of causation which has been gained has yet been of much advantage in treatment, except perhaps in a negative kind of way by suggesting that certain methods of treatment are to be avoided. Bacteriology, however, by regulating and extending the teaching of Semmelweis as to the accessory causation of puerperal fevers, has been of great service, and in a direction which in the case of preventable diseases like puerperal fevers is perhaps of more importance than treatment.

THE GENERAL PATHOLOGY OF PUERPERAL INFECTIONS.

The gross lesions which may result in one or other form of puerperal infection need not be considered now ; allowing for

the anatomical peculiarities and relations of the parts primarily
affected, these lesions do not present any essential differences
from lesions resulting from bacterial infections arising primarily
in tissues other than those of the female generative tract. The
presence of the large placental wound, however, and the
intimate relation of blood-vessels to its raw surface, afford
special facilities for the generalisation of an infection ; and
the position of the cavity in which the area first infected is
situate is such as to render direct surgical treatment of the
kind which possibly might be effectually applied in the case
of a more exposed part either difficult or impossible.

The processes concerned in the production of the symptoms
of puerperal fevers may be schematically and generally repre-
sented as follows :—

I. Infection of lacerations of the perineal tissues or of
the vaginal wall (sometimes with direct extension by
continuity of surface to the cavity of the uterus).
(*a*) Localised infection + toxæmia ;
(*b*) Localised infection + toxæmia + generalised
infection.

Or,

II. Primary infection of the contents of the uterus or of the
placental site.
(*a*) Localised infection + toxæmia ;
(*b*) Localised infection + toxæmia + generalised
infection.

This scheme of the course of puerperal infections is unfor-
tunately of but little assistance as a guide to treatment, for
the simple reason that clinically it is impossible to define the
precise point at which the condition of "localised infection
+ toxæmia" passes into that of "localised infection +
toxæmia + generalised infection." And, consequently, when
dealing with infections by bacteria which are capable of
existing and multiplying in the circulating blood, such as the
streptococci and micrococcus pneumoniæ, treatment must
practically always be carried out on the assumption that
the infection is already generalised, even if obvious clinical
signs that this is so are wanting. Other micro-organisms, on
the contrary, have little tendency to infect for any distance
beyond the area primarily affected, either by means of the

blood-vessels or by the lymphatics ; and some, the strictly anaërobic bacteria, are incapable of multiplying either in the circulating blood or in tissues in which the normal circulation of blood is still active, and in such cases the infection may usually be looked upon as remaining a localised one. With some of the anærobic organisms, however, there may be such wide invasion of contiguous tissues that any hope of treating the infection locally and effectually by surgical means will in the case of an organ such as the uterus prove fallacious.

THE CAUSATIVE PARASITES OF PUERPERAL FEVERS.

A consideration of the bacteria found in puerperal infections of the uterus may be commenced with a reference to the results obtained by the writer and Dr. Victor Bonney [6] in the bacteriological examination of the contents of the uterus in 54 cases in which fever followed either miscarriage or labour at full term, and was attributable to infection of the generative tract.

Our cases may be divided clinically into three groups :—

Group A. included 2 cases of miscarriage and 12 cases of labour at full term, in which the symptoms generally were of a severe type and in which death occurred.

Group B. included 4 cases of miscarriage and 22 cases of labour at full term, in which also the symptoms were severe, but with recovery ; in all these cases, as also in those of Group A., the temperature rose to above 102° F.

Group C. included 14 cases of labour at full term which were followed by what might be termed slight fever, without any severe constitutional disturbance, the rise of fever, such as it was, being the most marked symptom ; in one of these cases in which chorea came on after labour the temperature never rose above 99·6° F. ; in the other 13 cases the temperature ranged between 100° F. and 102° F.

It may be further explained that after the first 50 cases had been collected and examined they were classified, in the first instance, in two divisions according to the severity of the symptoms observed : one division (including Groups A.

and B. as above) comprising all cases in which the temperature had risen to above 102° F., and the other (Group C.) those in which the temperature had not risen above that point. The first division was then subdivided into Groups A. and B., according as to whether death had occurred or not. Having arrived at this clinical grouping, we then proceeded to consider the bacteriological findings in each case, and a reference to our paper will show that there was a very definite relation between these bacteriological findings and the severity of the symptoms observed. The remaining cases of the 54 were examined after we had completed the classification of the first 50, but all four were severe cases and were relegated to either Group A. or B. without difficulty.

In 15 of these cases the contents of the uterus were sterile of bacteria ; the bacteriological findings in the other 39 cases are set out in the table on p. 391.

The figures given in the table show that bacteria were found in the cavity of the uterus in 35 out of the 40 cases which were classified clinically as " severe " cases of puerperal fever (Groups A. and B.), whilst in 14 cases of " slight " puerperal fever bacteria were found in only four instances.

Streptococci, with or without other bacteria, were found in the uterus in 25 out of the 35 severe cases ; in 4 cases micrococcus pneumoniæ was positively identified, and in two other cases we isolated a diplococcus which culturally and in its staining characteristics corresponded exactly with the same species ; but inasmuch as the experimental inoculation of animals with these last two cultures were negative, we preferred to leave the species in doubt.

In the four remaining cases of the first two groups in which the cavity of the uterus was found to be infected, the results of the bacteriological examination were as follows :—

> In 1 case there were staphylococcus pyogenes aureus and B. coli communis,
> In 1 case, which terminated fatally, we found an unnamed diplococcus which did not stain by Gram's method (not micrococcus gonorrhœæ),
> In 1 case we found a " diphtheroid " bacillus in pure culture, and
> In 1 case we found the same species of diphtheroid bacillus

ANALYSIS OF THE RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF THE CONTENTS OF THE UTERUS IN 54 CASES (FOULERTON AND BONNEY).

Species of bacteria present in the uterus in 39 cases.

Species of bacteria present in the uterus	A. 14 cases. Miscarriage	A. 14 cases. Labour at full term	B. 26 cases. Miscarriage	B. 26 cases. Labour at full term	C. 14 cases. Miscarriage	C. 14 cases. Labour at full term	Total
Uterus sterile of bacteria.	—	—	—	5	—	10	15
Bacteria isolated from contents of the uterus :	2	12	4	17	—	4	39
Streptococci : in pure culture.	—	2	—	8	—	—	10
Streptococci and *B. coli communis.*	1	4	—	1	—	—	6
Streptococci and *Staphylococcus pyogenes albus.*	—	—	1	3	—	—	4
Streptococci, *Staphylococcus pyogenes albus,* and *B. coli communis.*	1	1	—	—	—	—	2
Streptococci, *B. coli communis,* and *B. pyocyaneus.*	—	—	1	—	—	—	1
Streptococci, *B. coli communis,* and another bacillus (Case 10).	—	1	—	—	—	—	1
Streptococci, *Staphylococcus pyogenes albus,* and a bacillus (Case 29).	—	—	—	1	—	—	1
Micrococcus pneumoniæ : in pure culture.	—	1	—	—	—	—	1
Diplococcus (+gram)? Micrococcus pneumoniæ : in pure culture (Case 13).	—	—	—	1	—	—	1
Micrococcus pneumoniæ, *B. coli communis,* and *Staphylococcus pyogenes albus.*	—	2	—	—	—	—	2
Micrococcus pneumoniæ and *B. coli communis.*	—	—	—	1	—	—	1
Diplococcus (+gram)? Micrococcus pneumoniæ and *B. coli communis* (Case 33).	—	—	—	1	—	—	1
Staphylococcus pyogenes aureus and *B. coli communis.*	—	—	—	1	—	1	1
Staphylococcus pyogenes albus : in pure culture.	—	—	—	—	—	1	1
Staphylococcus pyogenes albus and *B. coli communis.*	—	—	—	2	—	2	3
Diplococci (−gram) not M. gonorrhœæ : in pure culture (Cases 14 and 44).	—	1	—	—	—	2	2
"Diphtheroid" bacillus : in pure culture.	—	—	—	1	—	1	1
"Diphtheroid" bacillus and ? another bacillus (+gram).	—	—	1	—	—	1	2
Total.	2	12	4	17	0	4	39

Streptococci, in pure culture · 10 cases.
Streptococci, in pure culture with other bacteria · 15 „
— 25 „

Micrococcus pneumoniæ, in pure culture · 1 case.
Micrococcus pneumoniæ, with other bacteria · 3 cases.
? Micrococcus pneumoniæ 2 „
— 6

A. Cases terminating in death.   B. Severe cases with recovery.   C. Cases of slight fever.

associated with another bacillus which stained by Gram's method and closely represented the "diphtheroid" organism in its growth on artificial media.

In the 4 cases of "slight" puerperal fever (Group C.) in which bacteria were found in the uterus, we isolated staphylococcus pyogenes albus once in pure culture and twice associated with B. coli communis, and in the fourth case we found the same species of diplococcus (not staining by Gram's method) which had been observed in one of the fatal cases. Thus, assuming the identity of the two cultures of organisms resembling micrococcus pneumoniæ, in 40 severe cases we found streptococci in 25, M. pneumoniæ in 6, staphylococcus pyogenes aureus in 1, whilst in 3 cases the organisms found in the uterus were of doubtful pathogenic properties, and in 5 no bacteria were found in the uterus.

Out of 4 cases of "slight" puerperal fever we found in 3 micro-organisms, staphylococcus pyogenes albus and B. coli communis, which may be credited with some pathogenic activity; in the fourth we found one of the organisms of doubtful pathogenic properties which we had already found in the previous group, and in the remaining 10 cases no bacteria were found.

The results of the examinations made by the writer and Dr. Bonney agree with those of the work of previous investigators of puerperal infection with regard to the point which is perhaps of most importance practically, that is to say, our results prove again the predominating importance of streptococci in the causation of puerperal fevers. Our results differ, on the other hand, from those of any previous writer in the relatively large proportion of cases in which we found micrococcus pneumoniæ in the uterus; they differ conspicuously from the results of writers such as Krönig and Whitridge Williams in the absence of strictly anaërobic bacteria, and they differ from the results of both these two, of Vogel, and of several others, in the absence of micrococcus gonorrhœæ.

The following is an enumeration of the different species of bacteria which have been described as occurring in the cavity of the uterus by various workers at the subject of puerperal infections, and for the sake of convenience the species observed by the writer and Dr. Bonney will be referred to first.

(1) *Streptococci.*—It has been said that the results of our own work confirm the results of practically all previous researches in showing the importance of streptococci in puerperal infections, both from the numerical point of view and with regard to the mortality from puerperal fevers.

Thus in our complete series of 54 cases streptococci were found in the uterus in 46·2 per cent.; and out of 39 cases of fever following on either miscarriage or labour at full term in which bacteria were found in the cavity of the uterus, streptococci were found in 25, or in 64·1 per cent. Excluding the 14 cases of Group C., in which the symptoms were but slight and in which the temperature did not rise above 102° F., the importance of the streptococcal infections becomes still more marked. In Groups A. and B. there are altogether 40 cases, 6 in which fever followed miscarriage, and 34 in which it followed labour at full term ; amongst these 40 cases there were 14 deaths, 2 of which occurred after miscarriage, and streptococci were found in the cavity of the uterus in both these cases of death after miscarriage, and in 8 of the 12 cases in which death occurred after labour at full term. And, in addition, streptococci were found in the vaginal lochia of 2 out of the 5 cases in Group B. in which the uterus itself was sterile of bacteria.

Expressing the results in percentages, streptococci were present in 62·5 per cent. of the " severe " cases of puerperal fever (Groups A. and B.), and 46·2 of the complete series (Groups A., B., and C.).

The following figures give the results of others who have examined the bacterial contents of the uterus in cases of puerperal fever :—

	Number of Cases Examined.	Streptococci found in
Czerniewski - -	91	49, or 53·8 per cent.
Krönig -	179	75, „ 41·9 „ „
Whitridge Williams	150	44, „ 29·4 „ „
Vogel - -	24	7, „ 29·1 „ „
Total -	444	175, „ 39·4 „ „

The question of the specific identity of the various strains of streptococci which are found in puerperal and other infections

is a matter of extreme importance when one passes from the question of causation to that of treatment ; the writer has elsewhere expressed his views on this debatable, and already much debated, question, and believes that under the generic term streptococcus are to be included several different species of cocci which differ in their pathogenic action generally, and, which, differing in the character of their respective toxins, require for appropriate treatment different specific anti-toxins.

(2) *Micrococcus pneumoniæ.*—Puerperal infection by micrococcus pneumoniæ has been previously but rarely recorded. Weichselbaum [12] and Bar and Tissier [1] have recorded cases of puerperal infection by M. pneumoniæ ; but except for these cases and one or two others, including a case which Colin [3] has recorded in which a pneumococcic metritis developed after an abortion, and terminated fatally with meningitis, there is very little literature referring to the occurrence of this diplococcus as a cause of puerperal fever. When the writer and Dr. Bonney came across the first case of pneumococcic puerperal infection in their series it was thought worth while to record it in the *Transactions of the Obstetrical Society,*[5] but within the next two years three additional cases (one being a miscarriage, in which this coccus was found in pure culture in the uterus) were met with in which cultures of M. pneumoniæ, typical in all particulars, were obtained, whilst in two other cases we isolated a diplococcus which we believe to have been the same micro-organism, but which was not completely identified owing to failure of animal inoculation experiments.

It is not possible to say at present whether M. pneumoniæ is as common a cause of puerperal fever as our results would suggest ; it may be that by accident our series contains an exceptional number of these cases. But in any case it is not surprising that a parasite of such wide distribution as M. pneumoniæ should be found in this group of infections.

(3) *Staphylococcus pyogenes aureus.*—In spite of the common occurrence of this coccus in lesions elsewhere, and the ease with which it may usually be identified in culture, it appears to be relatively uncommon as a cause of puerperal infections ; it was only identified by the writer and Dr. Bonney once in their series of 54 cases, and the infrequency of mention of it by other writers on puerperal infections is noticeable.

(4) *Staphylococcus pyogenes albus.*—This coccus frequently occurs as a secondarily infecting organism complicating more severe primary infections by streptococci and other bacteria, in which respect it resembles B. coli communis as found in puerperal infections. A consideration of the clinical aspect of the cases in our series confirms the generally accepted opinion that the pathogenic action of this coccus is not severely felt ; whenever the coccus was found in a serious case it was associated with other bacteria known to be more actively pathogenic. Staphylococcus pyogenes albus was found in pure culture in the uterus in one case in which a feverish condition set in on the sixth day after delivery, and persisted until the twelfth, the temperature not having exceeded 100° F. up to the time when the culture was taken on the tenth day. In two of the "slight" cases the coccus was found in the uterus associated with B. coli communis ; in the first of these fever set in on the third day and subsided on the sixth, the temperature rose to 102° F., and the lochia were somewhat offensive ; and in the other case a feverish condition persisted from the third day until about the middle of the second week, but the temperature did not rise above 100° F.

(5) *A species of " diphtheroid " bacillus.*—In two of our cases we obtained a culture of a diphtheroid bacillus from the uterus ; in the first case the bacillus was found in pure culture in the cavity of the uterus in a case in which fever came on after an apparently normal confinement, and from high up in the cervical canal in a case in which fever came on after a miscarriage in the second month of pregnancy. In the second of these cases we thought at the time of our examination that the diphtheroid bacillus was associated with another somewhat similar organism, but further experience with this species, which shows marked variation in morphology under different conditions of culture, led us to the conclusion that probably we had for the second time a pure culture to deal with. In both cases the symptoms were of considerable severity, and it seemed probable that the diphtheroid bacillus was the cause of them, although, of course, its precise pathogenic position cannot be regarded as settled.

This organism is of interest for two additional reasons : in the first place, we also found it in the secretion of some cases of

cervical catarrh in non-pregnant women ; and in the second
place, because of the certainty that it would be mistaken for the
true diphtheria bacillus unless a full bacteriological examination
were made.   We have given a detailed account of the bacillus
in the *Transactions of the Pathological Society of London,*[4]
and it will be seen that it is possible to distinguish this organism
from B. diphtheriæ only by ascertaining that it does not
produce an acid in glucose litmus broth, and by the fact that it
is not pathogenic for the guinea-pig ; in its morphology, in its
staining characteristics, and in the manner of its growth on
most of the laboratory media, there is nothing to help one in
differentiating between this diphtheroid bacillus and the true
B. diphtheriæ.

(6) *An Unnamed Diplococcus* (— *Gram*).—This diplococcus
was found in pure culture in the cavity of the uterus in two
cases which differed widely in their character.   The first was
one in which severe fever came on seven days after a normal
confinement and terminated in death on the 15th day ; no
examination after death was made, and there were no means of
ascertaining whether any cause other than the uterine infection
might have been accountable for the symptoms.   The second
case was one in which there were some retained placental
fragments which were removed on the third day when the
temperature had risen to 101° F. ; an intra-uterine douching
was given, and the temperature was normal again within three
days.   The diplococcus grows well on gelatin without lique-
fying the medium, and also on all the ordinary laboratory
media, growth being rather more active at a temperature of
37° C. than at 22° C. ; it is readily decolourised when stained
by Gram's method.   The diplococcus could not be identified
with any named organism, and the question of its pathogenic
activity in the two cases in which it was found is open to
doubt.   It is, however, of some interest in that the same species
of diplococcus has been found, like the diphtheroid bacillus just
mentioned, in the secretion of cases of chronic cervical catarrh
in non-pregnant women.   A further point to be noted is the
possibility that this diplococcus may have been occasionally
mistaken for M. gonorrhœa in the superficial kind of bacterio-
logical examination upon which some, at any rate, of the earlier
writers upon puerperal infections appear to have relied.

This completes the list of bacteria which were found by the writer and Dr. Bonney as the presumably primary causes of uterine infection after childbirth. But, as has already been pointed out, our results show marked differences from those of some others in that we did not demonstrate the presence of either M. gonorrhœa or of bacteria belonging to the strictly anærobic species in any one of our 54 cases.

For instance, Krönig's results from the examination of 179 cases of puerperal endometritis showed 75 cases in which streptococci were found, 50 cases in which M. gonorrhœæ was found, and 32 cases in which strictly anærobic bacteria were the only organisms present. Whitridge Williams[16] in 150 cases of puerperal fever found streptococci in 44, M. gonorrhœæ in 8, anærobic bacteria in 8, and there were 45 cases in which bacteria of one kind or another were seen on stained coverslips, but not obtained in culture. Vogel examined the contents of the uterus in 24 cases of puerperal fever, not, however, using methods which would have allowed the detection of strictly anærobic bacteria, and found streptococci in pure culture twice and with bacteria other than M. gonorrhœæ three times, he found M. gonorrhœæ in pure culture twice and associated with streptococci twice also ; he suggests that the proportion of cases in which M. gonorrhœæ was found is perhaps unusually high.

In addition to M. gonorrhœæ and species of anærobic bacteria, there are certain other bacteria which have been found in the uterus as the primary cause, or alleged cause, of puerperal fevers, and which must be referred to here.

(7) *Micrococcus gonorrhœæ.*—The part which this micro-organism plays in the causation of puerperal fevers is, in the writer's opinion, still a matter of some doubt. Looking at the matter from the clinical point of view, we have evidence, on the one hand, that women who are suffering from gonorrhœal infection sometimes also suffer from fever in the puerperium. But, on the other hand, one may feel tolerably sure, from what is known as to the frequency of gonorrhœal infection and as to its persistence in the female, and also from the statistics as to the occurrence of gonorrhœal infection of the conjunctivæ of the new-born child, that a very considerable number of women must pass through childbirth with the cervical portion of the uterus infected with this parasite. And, having regard to

clinical evidence alone, it is doubtful whether gonorrhœal puerperal fever is nearly as common as it is believed to be by some writers. On the other hand, we have the very striking results of the examinations made by Krönig, which have been already referred to, and which seem to show that $27 \cdot 9$ of his cases of puerperal fever were of gonorrhœal origin. Then we have Whitridge Williams' series of 150 cases showing gonorrhœal infection in $5 \cdot 4$ per cent., and our own series of 54 cases apparently free from this kind of infection. It may be said at once that in our own series there were perhaps 6 cases in all in which, because of the nature of the bacteriological examination made, it is possible that M. gonorrhœæ may have been present and overlooked ; but in every one of these 6 cases there was other and sufficient cause for the symptoms observed. It seems probable, therefore, that Krönig's results are altogether exceptional, and that those of Whitridge Williams more nearly represent the relative numerical importance of M. gonorrhœæ as a cause of puerperal fever ; and it is possible that even these latter results may represent the occurrence of this form of puerperal fever as being more frequent than it actually is in the generality of cases. Clinically it would appear that gonorrhœal puerperal fever, when it does occur, is usually of a mild type, although some cases of gonorrhœal endometritis with fairly severe symptoms have been recorded.

It must not, of course, be forgotten that, in addition to what would be properly called gonorrhœal puerperal fever, caused by M. gonorrhœæ itself, a gonorrhœal infection may be followed by various secondary infections, and that the bacteria thus introduced into the vagina or cervical canal may themselves, on the occurrence of pregnancy, became a cause of puerperal infection.

A full account of the clinical aspects of this question of gonorrhœal infection in the puerperium has been given by Arnold Lea.[10]

(8.) *Anaërobic Bacteria.*—At present very little can be said with certainty as to puerperal infections by strictly anaërobic bacteria, and the actual numerical importance of this class of organisms in the causation of puerperal fevers is an open question. Several species, such as B. tetani, B. œdematis maligni, and B. aërogenes capsulatus, have from time to time

been described by different writers as occurring in puerperal
infections of the uterus, but until the publication of Krönig's
results there was no reason to suppose that anaërobic bacteria
were of such frequent occurrence as is indicated by the finding
of them in 32 out of 179 cases of puerperal endometritis.

The writer and Dr. Bonney, using Buchner's method of
cultivation, detected anaërobic organisms in only 1 out of the
54 cases of puerperal fever that were examined, and in that
one it seemed certain that the bacillus present merely repre-
sented a secondary infection added to a primary streptococcic
one ; and if anaërobic bacteria are really as common a cause of
puerperal fevers as Krönig's results would imply, it is obvious
that either we must have had an exceptional series of cases to
deal with, or else that we must have been singularly unfor-
tunate in our attempts at anærobic culture. But, as a matter
of fact, after excluding the severe cases in our series, in which
we found bacteria of known pathogenic activity in the uterus,
or in the vagina and associated with perineal laceration, and
also the cases of transient fever which were associated with
extensive laceration of the cervix or perineal tissues, there
remains but a small residue of cases for which no satisfactory
explanation of the fever could be found ; and it is only in
those few cases that it is likely that either M. gonorrhœæ or
anaërobic species may have been missed in the bacteriological
examination.

From what we know of the habits of growth and methods of
pathogenic action of the class of anaërobic bacteria generally,
it seems improbable that they occur frequently as a primary
cause of puerperal fever, except, perhaps, in cases in which
placental fragments are retained in the uterus.

The growth of strict anaërobes is inhibited by the presence
of either free oxygen or the loosely combined oxygen of the
circulating blood ; brought under these influences the bacteria
at once cease to multiply, pass into the sporing stage, and
become for the time harmless. From this characteristic it
follows that bacteria of the strictly anaërobic class are under
ordinary circumstances incapable of infecting a healthy wound,
or of existing in an active condition in tissues in which the
circulation is still active. Under ordinary circumstances,
therefore, the presence of these bacteria in a part denotes a

secondary infection ; that is to say, the wound is first infected by some aerobic pathogenic organism, such as one of the streptococci or pyogenic staphylococci, which causes by its action on the tissues a certain degree of venous stasis and lowers the power of resistance to anaërobic organisms which is derived from the presence of freely oxygenated blood in the tissues. If when such an infection as this has occurred the spores of one of the anaërobic bacteria, such as B. œdematis maligni or B. aërogenes capsulatus, are conveyed to the part they are placed under conditions favourable for germination and growth ; and if once the bacillus has established itself in the substance of an organ like the uterus extension of infection to neighbouring healthy tissue occurs automatically as it were.   Growth having started, toxins which have a powerful action on the tissues with which they come into contact are elaborated, and by this means a rapidly extending zone of dead and dying tissues may be formed, into which extension of the growth of the anaërobic bacillus readily proceeds.   With increasing growth of the bacillus, the formation of toxins is increased until it may be that death from a toxæmia occurs.

In the special case of the uterus it is probable that a retained placental fragment, or a piece of membrane, would afford a suitable nidus for the germination of the spores of an anaërobic organism ; and there is no doubt but that under the conditions an extension of infection to the tissues of the uterus might occur without the mediation of an anaërobic organism.

It has already been said that at least three definite species of strict anaërobes have been described as occurring in the puerperal uterus, either as causing the primary infection, or infecting secondarily.

Thus, B. tetani has been recorded in cases of puerperal infection.   In a case recorded by Kuehnau[9] the patient left her bed on the sixth day after delivery and then gave herself a vaginal douching ; 48 hours after the douching the lochial discharge became fetid, within the next two days pharyngeal spasm occurred, general tetanus followed, and the patient died.   After death streptococci, B. tetani, and B. coli communis were identified in the uterus.

B. œdematis maligni has been described as occurring in the

uterus in cases in which after death, usually resulting from abortion, an emphysematous condition of the subcutaneous tissue and of various organs has developed. In one such case which came under the notice of the writer death occurred five days after criminal abortion, probably induced by passing the handle of an old tooth-brush into the uterus. Within six hours after death localised areas of emphysema began to develop in the subcutaneous tissue ; at the examination the lining of the uterus was found to be in a sloughing condition, and a bacillus which was believed to be B. œdematis maligni was found with others within the organ.

B. aërogenes capsulatus, first described by Welch,[18] has been positively identified in the uterus in a number of cases which generally have resembled those in which B. œdematis maligni has been found ; there have been similar emphysema of the subcutaneous tissue and development of gas in the solid organs and in the veins, together with a sloughing fœtid condition of the lining of the uterus, the cavity of which may contain gas.

The rapid development of gas in the subcutaneous tissue after death is a characteristic of some of this class of bacteria, and results from the escape of bacilli into the blood-stream during the last hours of life. On the establishment of anaërobic conditions when death occurs there is at once growth of the bacilli, with consequent formation of gas in the tissues in which they have come to rest.

(9) *Bacillus Coli Communis.*—Although a few cases of apparently primary infection of the puerperal uterus by B. coli communis have been recoided, infection of the healthy placental wound by this micro-organism would seem to be of distinctly rare occurrence—contrary perhaps to what one would have expected. And the evidence which is available tends to show that a puerperal fever due to a pure infection by this bacillus is not likely to run a very severe course. On the other hand, the placental wound being already infected by some other micro-organism, B. coli communis is probably the most frequent of all the secondarily infecting bacteria met with in puerperal infections of the uterus.

Two special points with regard to infection, whether primary or secondary, of the uterus by B. coli communis may be mentioned. Some writers on obstetrics have mentioned

two signs met with in puerperal fevers as specially indicating infection by this bacillus—fœtor of the uterine lochia and the presence of gas in the cavity of the uterus, tympania uteri, or psychometria. The prominence which has been given to B. coli communis as a cause of these conditions is probably founded on the erroneous idea that this bacillus is a "putre-factive" organism, and this it certainly is not in the ordinary sense of the word. It is not by any means certain that B. coli communis is capable of causing any high degree of fœtor in a lochial discharge, and it is quite certain that other bacteria, bacilli of the Proteus group and anaërobic species, which have been described as occurring in the uterus, are capable of producing an extreme degree of fœtor. With regard to the production of gas in the cavity of the uterus, there is no evidence to show that B. coli communis is capable of producing free gas in more than almost inappreciable quantities from a proteid fluid such as the lochial discharge, whereas other bacteria, and more especially the anærobic species already spoken of, would produce gases in considerable quantity under the given conditions.

(10.)—*Bacillus diphtheriæ.*—Whilst the occurrence of this bacillus as a cause of puerperal infections has been frequently recorded, there is scarcely a single case of the kind in which its presence has been demonstrated up to the present time by proof of the nature which is required by the bacteriologist.

One may pass by at once the cases in which a "diphtheritic" infection of the vagina or uterus has been diagnosed by the presence of a "false membrane"; it is commonly known now that there may be nothing in the mere appearance of the false membrane produced on a mucous surface as the result of infection by B. diphtheriæ to distinguish it from the quite similar membrane which may result from infection of the same surface by streptococci, M. pneumoniæ, and other bacteria.

We have next to consider cases of puerperal infection which have been diagnosed as diphtheritic with rather better reason, either founded on clinical facts or on the results of a partial bacteriological examination, and of such the following may be quoted as examples :—

Longyear [11] gives an account of six cases of "puerperal diphtheria." His first case was that of a woman who-

developed pharyngeal diphtheria on the seventh day after delivery, the Klebs-Lœffler being found in the throat exudate. The patient apparently recovered from the throat infection, and returned to hospital some time later with a false membrane on the vagina and cervix ; she recovered after anti-diphtheritic serum had been used. Five other cases were recorded in which a false membrane formed on either the vagina or cervix, or on both, one of the patients dying. In all five cases specimens were submitted to the local Health Office, and in each case a report certifying the presence of the Klebs-Lœffler bacillus was returned. In these cases, in the absence of any information to the contrary, it is safe to assume that the Health Office issued its report after the examination usual in such cases : that is to say, after an examination of stained specimens of the alleged diphtheria bacillus as grown on culture media.

Nisot and Bumm have also each recorded a case of puerperal infection in which a culture of B. diphtheriæ was obtained ; in each case the patient recovered after anti-diphtheritic serum had been used. In these cases, again, there is nothing to show that any means for the identification of the bacillus other than culture and microscopic examination were used.

Whitridge Williams [14] has recorded a case of diphtheritic infection of the vulva which occurred under the following conditions. A membrane developed on the vulva on about the 12th day, and spread to the vagina ; two of the patient's children died of diphtheria at about the same time, and she herself recovered after the administration of anti-diphtheritic serum. Williams states that the Klebs-Lœffler bacillus was demonstrated in stained coverglass specimens ; and that a guinea-pig which had been inoculated died with an abscess at the site of the injection. In this case, again, the bacteriological proof appears to be confined to the morphological appearance of the alleged diphtheria bacillus and its staining characteristics ; clearly there was nothing in the result of the animal experiment to show that a culture of B. diphtheriæ had, in fact, been inoculated.

Haultain [8] has recorded as a case of intra-uterine diphtheria one in which a "typical pure culture of the Klebs-Lœffler bacillus" was obtained from the interior of the cervical canal during the puerperium ; a similar bacillus and streptococci

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Of these 15 cases in which the cavity of the uterus was apparently sterile of bacteria, 10 were primiparæ and 5 had previously borne at least one child. Excluding three of these cases, in which, the uterus being apparently sterile and no lesion of the lower generative tract being found, there was no satisfactory explanation of the fever, there remain 12 cases in which more or less extensive laceration associated with the presence of either S. pyogenes albus or B. coli communis was noted ; and ten of these 12 cases occurred in primiparæ.

So far the results of the examinations made by the writer and Dr. Bonney are consistent with clinical facts, in that they show that puerperal fever due to the infection of lacerations of the cervix or perineum occurs with a relatively much more marked frequency in the first confinement than in subsequent ones.

And further it is to be remarked that whilst it is obvious that the average case of puerperal fever due to infection of lacerations of the cervix or vagina is likely to be of less severity than the average case in which the cavity of the uterus is invaded by bacteria, it must not be forgotten that a streptococcic infection of such a laceration, with consequent septic thrombosis of the vaginal veins, may assume a severity equal to that of any streptococcic infection of the uterus itself.

THE INFLUENCE OF SECONDARY INFECTIONS IN PUERPERAL FEVERS.

The question of the relative importance of secondary infection in puerperal fevers is a very difficult one to decide. Streptococci being the commonest case of primary infection of the puerperal uterus, B. coli communis and S. pyogenes albus are the bacteria most frequently met with as the presumably secondary elements of mixed puerperal infections. Evidence already quoted in this paper would tend to show that the toxæmia and consequent symptoms arising from an infection by either of these two bacteria are usually not very severe ; but it is impossible to determine precisely the extent to which

such added toxæmia will influence the course of an already serious streptococcic infection.

If we simply place side by side the results of the bacteriological examination and the clinical facts we can say that cases in which there is a mixed infection of the uterus by streptococci and S. pyogenes albus are usually of greater severity than cases in which there is a pure infection by streptococci, and that cases in which there is a mixed infection by streptococci and B. coli communis are usually of greater severity than either of the others. And so far, no doubt, the result of the bacteriological examination may be of some assistance in prognosis. But it is not certain that we can go beyond this at present and say that a secondary infection by B. coli communis increases in any special degree the severity of a pre-existing streptococcic infection, as some writers have suggested. For whilst there may be some reason for this suggestion, it is also quite possible from what we know of mixed infections which include B. coli communis under other conditions, that the secondary invasion of the uterus by this micro-organism is merely an indication of the effects of an existing streptococcic infection of high virulence, which it does not materially aggravate. Some support perhaps is afforded to this explanation of the secondary infection by the fact that when a very severe case of mixed infection by streptococci and B. coli communis has been treated by an appropriate antistreptococcic serum there has been an almost immediate cessation of all serious symptoms, and there is no reason to suppose that the administration of such a serum would have the least effect on any toxæmia due to the presence of B. coli communis in the uterus.

It has been said already that at present our knowledge of the relative importance of bacteria of the strictly anaërobic class in the primary causation of puerperal fevers is in many respects deficient, and it has been pointed out that when present these bacteria will probably be most frequently met with as secondary elements in a mixed infection. And from what we know of the very active nature of the toxins elaborated by some bacteria of this class, it is easy to understand that in many cases the clinical importance of the secondary anaërobic infection may be far more considerable than that of the primary invasion.

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were found in the vaginal lochia, and the patient recovered after the administration of anti-diphtheritic serum. In the published report of the case no details are given of any experimental animal incculations; but in a private communication Haultain states that the results of animal experiments were such as to confirm the diagnosis.

Excepting Haultain's case it will be seen that in none of these cases of alleged puerperal diphtheria has adequate bacteriological proof of the nature of the infection been given. A reference to the description of the "diphtheroid" bacillus, described by the writer and Dr. Bonney[4] as occurring in the uterus in cases of puerperal fever, and found by them also in the cervical canal in cases of cervical catarrh in non-pregnant women, will show the impossibility of differentiating between this micro-organism and the true B. diphtheriæ except by the result of culture in glucose litmus broth and the experimental inoculation of guinea-pigs. And, again, excepting Haultain's case, in none of the cases of alleged puerperal diphtheria does it appear that either of these two tests were applied with positive result.

The clinical circumstances of some of the cases would, however, appear to justify a belief that a puerperal diphtheritic infection does occasionally, but rarely, occur.

The species now mentioned include the principal bacteria which have been described as causing a primary infection of the puerperal uterus; various other micro-organisms also have been described in this relation, but either they have been of uncertain identity, or the proof of their causative relationship with the illness has been defective. Amongst such bacteria one may mention incompletely described bacilli of the Proteus group and B. typhosus. The last has been referred to as a cause of primary puerperal infection mainly on the strength of a case reported by Dobbin.[3] The case was open to one of two interpretations, either it was a case of primary infection of the uterus occurring during, or soon after, labour, or else it was a somewhat severe case of typhoid infection of the ordinary type in which labour supervened. Dobbin was in some doubt as to which interpretation was the correct one, but inclined to that involving a primary uterine infection with subsequent general infection; but one can find nothing in the record of the case to

show that it was not one of ordinary typhoid fever contracted in the ordinary way, whereas there seems to be nothing in the case to specially suggest the unusual method of infection.

In what has immediately preceded attention has been given mainly to the causation of those forms of puerperal fever in which infection of the uterus has occurred, either primarily or by spontaneous extension from an infected laceration of the vagina. With regard to the other class of cases, those in which a puerperal fever is due to an infection of some laceration of the generative tract at the cervix or lower down, and without extension to the cavity of the uterus, there is very little to be said from the bacteriological point of view.

A reference to the table given above will show that out of 54 cases of puerperal fever there were 15 in which the uterus was sterile of bacteria, 5 of these coming in the class of cases in which the fever was clinically of a severe type, and the other 10 being cases of merely slight fever.

Amongst the 5 cases of a severe type there were 4 in which there was extensive laceration of either the cervix or perineum, or of both, associated with the presence in the vaginal secretion of streptococci in one case, of streptococci and B. pyocyaneus in one case, of B. coli communis and B. pyocyaneus in one case, and of B. coli communis and another bacillus which was not identified in the fourth, in the fifth case there were no obvious lacerations, and the uterine and vaginal lochia were sterile of bacteria.

Of the 10 cases of slight fever in which the cavity of the uterus appeared to be sterile of bacteria, there were 8 in which there had been distinct, and in some cases extensive, laceration of the cervix or perineum, and 2 cases in which no obvious laceration existed at the time of the examination.

In the 8 cases in which laceration was found the results of the bacteriological examination were as follows :—

Sterile of bacteria - - - - 1 case.
Staphylococcus pyogenes albus in pure culture 1 „
B. coli communis in pure culture - - 2 cases.
S. pyogenes albus and B. coli communis - - 2 „
S. pyogenes albus, B. coli communis, and an
  unidentified bacillus- - - - 1 case.
B. coli communis and an unidentified diplococcus 1 „

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Of these 15 cases in which the cavity of the uterus was apparently sterile of bacteria, 10 were primiparæ and 5 had previously borne at least one child. Excluding three of these cases, in which, the uterus being apparently sterile and no lesion of the lower generative tract being found, there was no satisfactory explanation of the fever, there remain 12 cases in which more or less extensive laceration associated with the presence of either S. pyogenes albus or B. coli communis was noted ; and ten of these 12 cases occurred in primiparæ.

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And further it is to be remarked that whilst it is obvious that the average case of puerperal fever due to infection of lacerations of the cervix or vagina is likely to be of less severity than the average case in which the cavity of the uterus is invaded by bacteria, it must not be forgotten that a streptococcic infection of such a laceration, with consequent septic thrombosis of the vaginal veins, may assume a severity equal to that of any streptococcic infection of the uterus itself.

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The question of the relative importance of secondary infection in puerperal fevers is a very difficult one to decide. Streptococci being the commonest case of primary infection of the puerperal uterus, B. coli communis and S. pyogenes albus are the bacteria most frequently met with as the presumably secondary elements of mixed puerperal infections. Evidence already quoted in this paper would tend to show that the toxæmia and consequent symptoms arising from an infection by either of these two bacteria are usually not very severe ; but it is impossible to determine precisely the extent to which

such added toxæmia will influence the course of an already serious streptococcic infection.

If we simply place side by side the results of the bacteriological examination and the clinical facts we can say that cases in which there is a mixed infection of the uterus by streptococci and S. pyogenes albus are usually of greater severity than cases in which there is a pure infection by streptococci, and that cases in which there is a mixed infection by streptococci and B. coli communis are usually of greater severity than either of the others. And so far, no doubt, the result of the bacteriological examination may be of some assistance in prognosis. But it is not certain that we can go beyond this at present and say that a secondary infection by B. coli communis increases in any special degree the severity of a pre-existing streptococcic infection, as some writers have suggested. For whilst there may be some reason for this suggestion, it is also quite possible from what we know of mixed infections which include B. coli communis under other conditions, that the secondary invasion of the uterus by this micro-organism is merely an indication of the effects of an existing streptococcic infection of high virulence, which it does not materially aggravate. Some support perhaps is afforded to this explanation of the secondary infection by the fact that when a very severe case of mixed infection by streptococci and B. coli communis has been treated by an appropriate antistreptococcic serum there has been an almost immediate cessation of all serious symptoms, and there is no reason to suppose that the administration of such a serum would have the least effect on any toxæmia due to the presence of B. coli communis in the uterus.

It has been said already that at present our knowledge of the relative importance of bacteria of the strictly anaërobic class in the primary causation of puerperal fevers is in many respects deficient, and it has been pointed out that when present these bacteria will probably be most frequently met with as secondary elements in a mixed infection. And from what we know of the very active nature of the toxins elaborated by some bacteria of this class, it is easy to understand that in many cases the clinical importance of the secondary anaërobic infection may be far more considerable than that of the primary invasion.

THE SOURCES OF INFECTION.

An immense amount of consideration has been given to various matters bearing on the question as to the relative frequency of puerperal infection conveyed by those who attend on the patient during her labour and puerperium and that arising from sources within the patient herself, auto-infection; the former source of infection is clearly to be regarded as avoidable, the other as unavoidable in a greater or less number of cases according to the exact sense in which the term "auto-infection" is used. The tendency of most writers at the present time is to minimise the importance of auto-infection as a cause of puerperal fever, sometimes to the extent of almost ignoring it. If we consider only the most severe forms of puerperal infection, this generalisation probably represents the state of the case sufficiently accurately for ordinary purposes; and in emphasising this view of the matter, writers have probably had in their mind the desirability of impressing both the student and the practitioner with the necessity for ordinary surgical cleanliness. But if we regard all cases of puerperal fever from the point of view of causation, it is highly probable that quite a considerable number of them have their origin in auto-infection, the actual proportion depending again upon the precise meaning attached to this term.

The importance numerically of streptococcic infections in the causation of puerperal fevers, and consequently as a factor in the mortality caused thereby, is beyond question; and we have very clear evidence that in a very large majority indeed of the cases of streptococcic puerperal fever the infection must be conveyed to the patient from without. Perhaps the best evidence of this is found in the fact that patients in well-conducted lying-in hospitals in this country run practically no risk of streptococcic infection during their confinement; or, in other words, the more thorough the precautions taken against the conveyance of infection from without the lower is the morbidity from this form of puerperal fever. The series of cases of puerperal fever which were investigated and collected by the writer and Dr. Bonney represented results occurring in almost every class of practice—in private practice, in the extern department of a large London hospital, in the lying-in wards of poor-law law infirmaries, and in the wards of a

lying-in hospital ; and whilst several of the cases of puerperal fever came from the lying-in hospital, they were all of a mild type clinically, and did not include a single case of streptoccic infection. It may be just mentioned that out of the 25 cases of streptococcic infection included in the series of 54 cases, 5 occurred amongst the patients of two practitioners, one of whom had 3 and the other 2 cases, in each case within an interval of a few days ; it may be added that the contents of the bag of instruments used by one of these practitioners were found to be in an extremely dirty condition.

Some statistics given by Whitridge Williams [15] may be quoted as illustrating the same point. A bacteriological examination was made of the contents of the uterus in 40 cases of puerperal fever, 22 of the cases occurring in the obstetrical wards of the Johns Hopkins Hospital, 5 in connection with the extern department of the same institution, and 10 in the private practice of different medical men. There were no cases of streptococcic infection amongst the 22 cases of fever which occurred in the in-patients, there were three cases of strepto-coccic infection amongst the eight patients of the extern department, and five cases of streptococcic infection amongst the ten occurring in private practice.

With regard to the next most serious group of cases in our series—those of pneumococcic infection—there is little evidence to show whether or not these cases are usually due to infection from without ; but it is at any rate suggestive that amongst our cases of pneumococcic infection there were two which occurred in the practice of the same medical man, and within a few days of each other.

Infection by anærobic bacteria, whether primary or secondary, may in most cases be assumed to be conveyed from an outside source, although the presence of bacteria of this class in the contents of the neighbouring bowel would suggest a possible source of infection in the patient herself.

Using the word in its widest meaning, as signifying infection from any source connected with the patient herseif, auto-infection of the puerperal uterus may occur in several ways :—

> (*a*) there may be infection by bacteria carried by the blood to the uterus from some focus of infection localised in a remote part of the body ; ·

(*b*) there may be infection by bacteria existing before the onset of labour in the cervical canal or in the upper part of the vagina ; and

(*c*) bacteria from the lower part of the vagina or from the external parts may be conveyed to the uterus by the passage of the finger used for purposes of examination, or by means of instruments.

Whilst in the last class of infections the source of infection is certainly the patient herself, the conveyance is by an external agency and is altogether avoidable, in the same sense that infection from outside is avoidable.

Infection arising in either of the first two ways represents what is understood by the majority as auto-infection ; it is to a large extent unavoidable, and its conveyance is independent of external agencies in most cases.

The first-mentioned method of auto-infection of the puerperal uterus, that is to say, by bacteria carried there from some other part of the body, is probably not of very frequent occurrence. Wormser has recorded a case in which a severe general streptococcic infection apparently occurred in this way, the source of infection being a suppurating sphenoidal sinus. And it is easy to understand that a uterus which contains a placental fragment or piece of membrane would afford a very favourable nidus, a point of lowered resistance, for the growth of any stray bacteria which may have escaped into the blood from some localised focus of infection elsewhere. It is probable that this escape into the blood of bacteria does occur under many conditions of apparently localised suppuration ; under ordinary circumstances such stray bacteria do not necessarily multiply in the blood, but are destroyed, or eliminated without causing any further mischief, unless they happen to effect a lodgment in some area of lowered resistance. The examination of the uterus of a woman who had died from acute lobar pneumonia, in the course of which a late miscarriage had occurred, afforded a good, although perhaps extreme, example of this. A small piece of placenta had been retained in the uterus, and the diplococci were present in the placental fragment and in the lochial discharge in extraordinary numbers, having evidently ound there conditions extremely favourable for growth.

The question of auto-infection by means of bacteria existing in the cervical canal or in the upper part of the vagina at the time of labour is one which has occasioned much divergence of opinion, and very different results have been obtained by those who have specially investigated the bacteriology of the vaginal secretion in pregnant women. The writer himself has no special experience in the examination of the vaginal secretion in pregnant women, but, with Dr. Bonney, he examined the cervical secretion of 30 women who were the subjects of cervical catarrh, and who were believed not to be pregnant. In 11 of these cases the cervical secretion was sterile, in 19 it contained various bacteria, including several species which we had previously found in the cavity of the uterus in cases of puerperal fever. The diphtheroid bacillus which has been referred to above was found in the cervix in 6 cases, and the unnamed diplococcus (— Gram), which has also been referred to as occurring in 2 cases of our series of puerperal infection, was found 1 ; we also found S. pyogenes aureus in 2 cases, M. gonorrhœæ in 1 case, B. coli communis in 1 case, and S. pyogenes albus, with or without other bacteria, in 6 cases. Now, there is no reason to suppose that the cervical canal is naturally sterilised at the onset of pregnancy ; and in view of the results of our examination, it seems difficult to exclude the cervical secretion as a possible source of auto-infection in a considerable number of cases.

If the views of some as to the great frequency of gonorrhœal puerperal fever are well-founded, it is obvious that auto-infection must play a part of much greater importance in the causation of puerperal fevers than many are disposed to admit.

The matter is one which can be settled only by bacteriological evidence, and unfortunately this, as recorded by different observers, is strangely contradictory. Whitridge Williams,[16] who has himself carried out a number of investigations into the bacteriology of the vaginal secretion in pregnant women, gives a very fair summing-up of the evidence on both sides, and comes to the conclusion that bacteria likely to be the cause of puerperal infections are not to be found, except rarely, in the upper part of the vagina.

The results obtained by the writer and Dr. Bonney in the examination of the secretion in cases of chronic cervical catarrh,

which would probably be no bar to pregnancy, together with much other evidence, point, however, strongly in the opposite direction.

At the same time it may be repeated that the puerperal fever which is likely to follow auto-infection will usually be of a comparatively mild type.

THE PREVENTION OF PUERPERAL INFECTIONS.

It would be altogether outside the scope of the present paper to attempt to deal generally with questions relating to the prevention and treatment of puerperal fevers ; but there are certain points connected with both which may be briefly referred to from the bacteriological point of view.

Whilst there is practically little difference of opinion as to the broad principles on which are founded the precautions which should be taken to guard against puerperal infection conveyed from outside sources, there is considerable difference of opinion as to the advisability of taking special measures to provide against the danger of auto-infection. This difference of opinion as to the necessity for preventive methods follows naturally on the difference of opinion, already referred to, which exists with regard to the importance of auto-infection in the causation of puerperal fevers. Those who believe that the risk of auto-infection is a serious one advocate free douching of the vagina before labour, in the hope of rendering the vagina aseptic ; whilst those who believe that the cervical canal and the upper part of the vagina are usually sterile of harmful bacteria deprecate this douching as unnecessary, and moreover assert that it may itself be a source of danger arising from the conveyance of harmful bacteria from the lower to the upper part of the vagina.

Leaving the question of the necessity for these douchings on one side, the objection thus urged against them seems a somewhat fanciful one. It is, I think, tolerably certain that if any bacteria were conveyed in this manner to the upper part of the vagina they would be at once washed down again by the subsequent douching. This objection to douching, therefore, cannot be held to be valid.

But whilst the writer believes that the danger of auto-infection is a real one, it is extremely doubtful whether

douching of this kind is of any practical value, so far at any rate as the object immediately aimed at is concerned.

It seems probable that the cervical canal is the source of the most serious potential danger, and there is small probability that bacteria in this situation will be in any way affected by the douching which is usually employed.

Wormser,[17] who is an advocate of the method, has reported the morbidity from puerperal infection at Bâle during three years; in the first two years no special attempts were made to disinfect the vagina, in the third year vigorous syringing of the vagina combined with digital manipulation (Hofmeier's method) was employed. The results were as follows, and it does not appear that they tell very strongly in favour of the method:—

		Total Number of Confinements.	Percentage of Afebrile Cases.
1897.	No disinfection of vagina -	933	81·9
1898.	No disinfection of vagina -	1,066	84
1899.	Disinfection attempted -	1,225	86·7

THE TREATMENT OF PUERPERAL FEVER.

There are only two matters connected with the treatment of puerperal fever which need be referred to here, and those will be referred to in the briefest manner possible.

The first matter is the employment of active curettage for the local treatment of uterine infection, the use of which has been, and still is, recommended by some authorities who divide cases of puerperal fever roughly into two classes according as the fever is thought to be dependent upon a " putrid" or a " septic" endometritis. Puerperal fever which is the consequence of a " putrid" endometritis is held to be due to bacteria which are supposed to be located only on, or quite near to, the surface of the lining of the uterus, whilst the "septic" form is described as that caused by bacteria which have a tendency to invade the uterus deeply, such as the streptococci and M. pneumoniæ. For the "putrid" form of endometritis curettage is advised, whilst it is recognised that it will be usually useless in the " septic" form.

If the classification of cases into " putrid" and " septic" were founded on a sound pathological basis there would

doubtless be good grounds for the advocacy of curettage ; but, unfortunately, it is not possible to divide cases of puerperal endometritis pathologically into these two classes, because of the frequent combination of the features of both forms in the same case ; thus a mixed infection in which streptococci or pneumoniæ are present may result in the most typically " putrid " form of endometritis.

And again, on the other hand, the same objection which applied to the older division into "septicæmic" and "sapræmic" types applies again, in that the clinical diagnosis is so extremely uncertain. It is quite certain that in many cases it is impossible to diagnose with any approach to certainty between what used to be termed a " sapræmia " and some of the milder cases of streptococcic infection ; and the treatment by curetting which might be harmless in a " sapræmia " case, would probably be the means of converting a slight case of streptococcic infection into one of extreme severity.

I think that a consideration of the pathology of puerperal fevers generally warrants one of the conclusions arrived at by the writer and Dr. Bonney as the result of their investigations into the bacteriological side of the matter, that is to say, in the absence of exact bacteriological diagnosis, the safe rule is to treat every case of puerperal fever as being probably of streptococcic origin.

In cases in which there is an infection by streptococci, M. pneumoniæ, or other bacteria which have a tendency to infect the tissues deeply, curetting is to be unreservedly condemned. When penetration of the deeper layers of the uterus by the bacteria has occurred, curettage cannot possibly do any good at all ; when the infection is still limited to the surface of the uterine wall, there could be no surer way than curettage of infecting the deeper tissue.

Again, in what would on the surface appear to be the most likely cases for the employment of curettage—cases of infection by strictly anaërobic bacteria, unaccompanied by streptococci or bacteria of that class—it is difficult to see that good could result in many cases ; the probabilities of removing infection from the uterus would seem to be small indeed, however thoroughly the operation may be carried out.

And, on the other hand, it would appear that the routine

practice of digital exploration of the uterus with subsequent douching now usually carried out at the onset of puerperal fever represents the best that can be done under the circumstances.

The last point to which reference need be made, is the question of the treatment of streptococcic puerperal fever by anti-toxic serum. The writer[7] has recently dealt with this question at ome length, and it is not necessary to refer to the matter in detail again. It need only be pointed out that disappointment which has resulted in so many cases of puerperal fever in which an anti-toxic serum has been used is only what might be expected under the circumstances in which the serum has been used. Given an exact diagnosis, an appropriate anti-toxic serum, and sufficient dosage, there is no doubt whatever in the mind of the writer that the success which has attended the use of the serum in some cases of streptococcic puerperal fever might become much more general.

REFERENCES.

[1] Bar and Tissier: "Séropathie dans l'infection puerpérale," *L'Obstétrique*, pp. 97–204, 1896.

[2] Colin: *Münchener med. Wochenschrift*, p. 1338, 1899.

[3] Dobbin: "A case of Puerperal Infection in which B. typhosus was found in the uterus," *Amer. Journal of Obstet.*, Vol. XXXVIII., 1898.

[4] Foulerton and Bonney: "A Diphtheroid Bacillus Isolated from the Uterus in two cases of Puerperal Fever," *Trans. Path. Soc. of London*, Vol. LIV., 1903.

[5] Foulerton and Bonney: "A Case of Primary Infection of the Puerperal Uterus by Diplococcus pneumoniæ," *Trans. Obstet. Soc. of London*, 1903.

[6] Foulerton and Bonney: "An Investigation into the Causation of Puerperal Infections," *Trans. Obstet. Soc. of London*, 1904.

[7] Foulerton: "The Treatment of Streptococcic Puerperal Fever by Antitoxic Serum," *The Lancet*, Vol. CLXVII., 1904.

[8] Haultain: *Trans. of Edinburgh Med. Soc.*, Vol. XXII., 1897.

[9] Kuehnau: *Berliner med. Wochenschrift*, 27–29, 1898.

[10] Lea: "The Influence of Gonorrhœa on |the Puerperium," *Trans. North of England Obstet. and Gynæcol. Soc.*, 1900.

[11] Longyear: "Puerperal Diphtheria," *Amer. Journal of Obstet.*, Vol. XXXVI., 1897.

[12] Weichselbaum: *Wiener klin. Wochenschrift*, 28, 1888.

[13] Welch: "Morbid Conditions caused by B. ærogenes capsulatus," *Boston Med. and Surg. Journal*, Vol. CXLIII., 1900.

[14] Whitridge Williams: "Diphtheria of the Vulva," *Amer. Journal of Obstet.*, Vol. XXXVIII., 1898.

[15] Whitridge Williams: "Forty Cases of Fever in the Puerperium," with Bacteriological Examination of the Uterine Contents," *Amer. Journal of Obstet.*, Vol. XXXVIII., 1898.

[16] Whitridge Williams: "Puerperal Infections," *Text-book of Obstetrics*, 1903, London and New York.

[17] Wormser: "L'Infection de la cavité utérine pendant les suites de couches," *La Semaine Médicale*, 7 Nov., 1900.

THE BLOOD IN PUERPERAL FEVER.

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IN the examination of the blood for diagnostic purposes the two chief groups of methods available are the *cytological* and the *bacteriological*. Each has its advantages and disadvantages. The advantages of the latter method are that it yields definite results which require no skilled interpretation, and which may give important suggestions as to treatment; for example, the demonstration of streptococci in the blood-stream indicates, practically without possibility of error, the presence of a streptococcic septicæmia, and points to the advisability of the use of antistreptococcic serum. The disadvantages of the method are that the process is somewhat difficult, requiring a certain amount of bacteriological training, and access to a properly furnished laboratory ; the greater amount of pain and inconvenience to which the patient is necessarily submitted ; and the delay occasioned by waiting for the development of cultures, which may take forty-eight hours. The possibility of error arising through accidental contamination may be practically excluded when the examination is carefully made.

The great advantage of the cytological methods of investigation (under which I include the estimation of hæmoglobin) are that they can be carried out rapidly, and that the technique can be learnt without difficulty. The apparatus required is not elaborate, and the necessary amount of blood is so small that it can be obtained without inflicting pain, or even without the patient's knowledge. On the other hand, the *interpretation* of the results obtained is often extremely difficult, and should never be attempted without a full knowledge of all the information that can be obtained from other sources. Take, for instance, the well-known law that the formation of an acute abscess is accompanied by a high leucocytosis—a law to which exceptions are excessively rare, if they actually occur. The actual application of this law is often a matter of considerable difficulty. I have seen on two occasions a rapid fall in the

number of leucocytes following the intra-intestinal rupture of an appendicitic abscess, the number falling in twenty-four hours or less to a figure much below that which is necessary for the diagnosis of pus. On each occasion, if the patient had been examined for the first time after the rupture had occurred, the presence of pus would have been negatived. It is not the mere presence of pus, but the passage of the bacterial toxins, &c. into the circulation, which causes leucocytosis ; and this passage ceases to take place when free drainage is provided, whether by natural or artificial means. Again, when the bacteria in an abscess are killed by the natural defences of the body, or even when they are so reduced in virulence that the abscess wall undergoes organisation into firm fibrous tissue, leucocytosis is not marked and may be entirely absent. This is very commonly the case in pyosalpinx at the stage in which it is usually diagnosed and operated on : there is little or no leucocytosis, and the pus from the abscess consists of highly degenerated leucocytes, and is sterile. It is thought by some that these cases are of gonorrhoeal origin, and that the gono-coccus does not cause a high leucocytosis. This, apparently, is so in gonorrhoeal peritonitis, but I am doubtful whether the explanation holds in gonorrhoeal pyosalpinx. In one case which I observed, blood-counts were made in the acute stage of the disease, and the leucocytosis was very marked ; but when the symptoms had quieted down, the leucocytes fell to normal. A few gonococci, which were not cultivated, were found in the pus. The absence of leucocytosis, therefore, is not inconsistent with the presence of pus, but may occur when the pus drains freely or is encysted, or contains only dead bacteria. Another source of fallacy is the presence of other diseases, *e.g.*, tonsil-litis, pleurisy, or pneumonia, any of which may may cause a high leucocytosis. Lastly, it must not be forgotten that even where the blood-examination points strongly to the presence of suppuration, it affords no clue as to its site. In one case, of which 1 heard recently, laparotomy was performed on a patient in whom appendicitis was suspected, and in whom there was a high leucocytosis. The patient was found to be suffering from intussusception, and the cause of the leucocytosis was found subsequently in the form of a small abscess of the breast. It should also be pointed out that an ovarian cyst with twisted pedicle may cause the leucocytes to rise to a very high figure.[1]

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In puerperal cases the intepretation of the leucocyte count is more than usually difficult, since we are dealing with a condition in which the figure, instead of remaining fairly constant at a more or less definite level, as it does in health, normally exhibits great variations. This subject has been carefully investigated by Cabot, Henderson,[2] Halla,[3] Reider,[4] and others. It is found that the numbers of leucocytes gradually rise from the fourth month to the end of the pregnancy. The average count at term is given somewhat differently by the different authors ; Henderson's average of a large series of cases coming out at about 21,000 per cub. m.m., whilst most observers report a decidedly lower figure. But numbers even higher than this are frequently found ; Cabot, for instance, reporting one of 36,000. All observers find that the rise is most marked in primiparæ, Hubbard and White[5] give the averages as primiparæ 15,000, multiparæ 11,700 per cub. m.m., and Reider found no leucocytosis in 11 out of 17 multiparæ. The cause of this leucocytosis is at present obscure.

It is evident, therefore, that serious errors may arise if an attempt is made to diagnose inflammatory conditions by an enumeration of the leucocytes in the later stages of pregnancy. Under ordinary conditions a count of 18,000–20,000 leucocytes per cub. m.m. may be taken as almost definite proof of an acute infective process ; but since the number in pregnancy, apart altogether from disease of any sort, may nearly double these figures, no reliance whatever can be placed on a count which is not very much higher. Nor does the problem become easier in the puerperium. In most cases the number of leucocytes falls rapidly and fairly uniformly during the first week, and more gradually during the second, reaching the normal level about the end of that period. In some cases the fall is more rapid than this, and in others it may be delayed by slight lesions in the breast, &c. Thus it is never possible to foretell, even approximately, the number of leucocytes which will be found on the first examination of a woman during the puerperium, nor to state the importance to be attached to a moderate increase above normal. *Repeated* examinations are of more value, and they should be made at about the same time of the day, so as to avoid the possibility of error from a digestive leucocytosis. There should be a fall from day to day, and if the number rises, there is certainly, and if it remains

constant, probably, an infective process of some kind at work. Where the base-line is so inconsistent, it is obvious that no definite figures can be given as to the numbers by which different diseases can be diagnosed ; as a general rule, a moderate and gradual rise indicates septicæmia, whilst a sudden rise, often to a very high level, points to the development of a local abscess. It must not be forgotten that some cases of septicæmia are not attended with leucocytosis, or may even show a diminution in the numbers of the white cells. These cases are very severe, are readily diagnosed clinically, and almost invariably end fatally. In my experience they are very rare. I have never seen them in puerperal cases, and not often in other forms of septicæmia ; even in the most rapid and fatal cases the rule is for some leucocytosis to occur.

Some investigators attach more importance to the *relative* leucocyte count. The increase in septicæmia, suppuration, and other toxæmias is due almost entirely to polynuclear cells, and this relative increase (to 80 per cent. or much more) usually occurs even when the total rise is absent or but slightly marked. Unfortunately, however, the rise in pregnancy and the normal puerperium is due mainly to an increase in the polynuclears, so that the differential count is not of great value in this condition.

The iodine reaction is of greater value and is very easily tested. Thin blood films are dried in the air and forthwith mounted in a solution of iodine 1 part, iodide of potassium 3 parts, saturated watery solution of gum acacia 100 parts (Gabritschewski's solution). Under ordinary circumstances the whole film appears of a yellowish colour, whilst there may or may not be extra-cellular granules which are stained a deep brown. These have been variously identified as glycogen or as other substances, but their exact nature is not of importance. In septic conditions (as well as in other toxæmias) similar granules, small and large, are seen in the polynuclear leucocytes, which may also contain large masses, or the whole protoplasm may stain deep brown. In this examination daylight should be used, and the practitioner is strongly recommended to familiarise himself with the appearances seen in normal bloods and in cases of undoubted sepsis before applying it in actual practice. Dutzmann [1] and, Locke [6] have

recently emphasised the value of this reaction, and the latter has pointed out that it can be obtained in cases of general peritonitis, &c., when the leucocyte count is not raised. It must not be forgotten, however, that it is not a specific sign of sepsis, and may be produced by any severe toxæmia.

The behaviour of the red corpuscles and hæmoglobin is of considerable importance. During pregnancy no reduction takes place if the patient's health and nutrition are maintained.[7] But it is not uncommon to find a slight reduction in the poorer class of patients. Thus Henderson found that in hospital patients in Glasgow the average number of red corpuscles at term was about 4,000,000. The hæmoglobin (estimated by Gower's method) was approximately 70 per cent. This shows a slight reduction of the colour-index, as is the rule in secondary anæmia of some duration. The amount of reduction which takes place after delivery depends, of course, on the amount of blood lost ; under ordinary circumstances it is not great, Henderson's figures averaging 3,900,000 per cub. mm. The fall usually continues for two or three days, but it is extremely slight after the first 24 hours. Then regeneration commences, and the numbers reach their normal level (or even a slightly higher one) in something under a fortnight. In acute sepsis this rise does not take place, and in most cases there is a rapid and pronounced fall. The most marked case on record is that of Grawitz,[8] in which puerperal sepsis, combined, however, with hæmorrhage, reduced the red corpuscles to 300,000 in 24 hours. Hayem[9] reported a case of puerperal fever in which the red corpuscles were reduced to 1,450,000 per column and the hæmoglobin to 20 per cent. This gives a colour-index of ·6, indicating, what is found to be a general rule, that in sepsis the reduction affects the hæmoglobin more rapidly than the reds. The numbers quoted above are, of course, excessive, but in most cases of puerperal septicæmia there will be found to be a marked reduction from day to day, both in the hæmoglobin and in the red corpuscles ; as a rough average, we may expect a reduction of some 50,000 corpuscles and 2 to 5 per cent. of hæmoglobin per diem. It is hardly necessary to say that if hæmorrhage is taking place this method of examination is difficult of application unless the anæmia is out of proportion to the loss of blood. But in anæmia of sudden onset due to

this cause the colour-index remains at its previous level, whereas in anæmia due to septicæmia it falls. The formation of a localised abscess leads to a slight reduction, or none at all.

In cases of septic infection in which the diagnosis is definitely established, the behaviour of the red cells affords some basis as to prognosis. The more rapid the reduction the worse the outlook and *vice versâ;* and in a case in which blood-counts are made from day to day the cessation of the fall is a sign of good omen.

To sum up. At term the patient may or may not be slightly anæmic; if anæmic the hæmoglobin is affected rather more than the red corpuscles, leading to a slight reduction of the colour-index. The leucocytes are increased in number, especially in first pregnancies, and the increase mainly affects the polynuclears. During a normal puerperium the number of the leucocytes commences to fall soon after delivery and continues to do so for about a fortnight, whereas the red corpuscles and hæmoglobin fall slightly for a day or so and are then gradually regenerated. When the process is arrested by a general septic infection the fall in the leucocytes ceases, and is replaced by a gradual rise, the increase being due mainly to an increased number of polynuclears. At the same time, the regeneration of the reds ceases, and is replaced by a fall in the hæmoglobin, and a smaller fall in the red corpuscles. The iodine reaction is well marked. When abscess formation occurs apart from a general septicæmia, the rise in the leucocytes (due in this case also to polynuclears) is more sudden, and a higher level is reached. The hæmoglobin and reds are affected slightly, if at all; and the leucocytes give the iodine reaction.

REFERENCES.

[1] Dutzmann: *Monats. f. Geb. u Gyn.*, Bd. XVIII.
[2] Henderson: *Journ. Obst. and Gyn. of Brit. Empire*, 1902.
[3] Halla: *Prag. Zeits. f. Heilk*, 1883.
[4] Reider: *Beiträge zur Kenntn. d. Leucocytoses*, 1892.
[5] Hubbard and White: *Journ. of Expt. Med.*, 1898.
[6] Locke : *Boston Med. and Surg. Journal*, 1902.
[7] Schroeder: *Archiv. f. Gyn.*, Bd. XXXIX.
[8] Grawitz: Quoted by Ewing, *Clin. Path. of Blood.*
[9] Hayem: *Méd. Modernes*, 1897.

ON AN EPIDEMIC OF PUERPERAL FEVER A CENTURY AGO.

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WE have before us a work bearing the following title :—" A treatise on the Puerperal Fever, illustrated by cases which occurred in Leeds and its vicinity in the years 1809–1812. By William Hey, Junior, Member of the Royal College of Surgeons of London, and Surgeon of the General Infirmary and of the House of Recovery at Leeds. London, 1815." This account of an epidemic of puerperal fever at a time when the nature of such diseases was so little understood, when the causes of its spread were a mystery, and when its ravages were practically unchecked by art, cannot fail to interest us. The experiment of allowing an epidemic of puerperal infection of erysipelatous nature to take its course, unhampered by any adequate measures of asepsis or antisepsis, cannot be repeated, but this is what Hey's records describe. The reader may indeed be inclined to wonder that the epidemic ever ceased at all, but here the limitations of our own knowledge are felt. To-day we may indeed recognise, name, and cultivate microörganisms, but we have much to learn as to their natural history. We need to discover how they acquire their virulence and how they lose it ; why, according to time, place, season, race, individual, they sometimes find conditions of resistance which prevent their growth, but at other times find a soil in which they can develop and exercise their powers of mischief to the utmost.

The second William Hey was surgeon to the Leeds Infirmary from 1812 to 1830. A well-executed marble bust, which stands in the entrance-hall of the Infirmary, has made his fine head and his kindly intellectual features familiar to all Leeds students. He was not so famous as his father William Hey, F.R.S., the Hey of " Hey's Ligament " and " Hey's Amputation," but he was a good and able man. No Yorkshire practitioner can speak of the Heys and their work without respect, least of all

any of the members of the Infirmary staff who enter into their labours.

"For some years past," says Hey in March, 1815, "the puerperal fever has prevailed epidemically in different parts of Yorkshire. It appeared first at Barnsley, twenty miles south of Leeds, where it was very prevalent and very fatal. It began there in the year 1808, nearly two years before it became general in Leeds. The disease which is the subject of the following pages commenced in the month of November, 1809, and continued in different degrees of severity and with some considerable intermissions till Christmas 1812 ; from which time, being myself confined by an indisposition which lasted throughout the year 1813, I saw no more of it. During the period of its continuance it was not confined to the town and immediate vicinity of Leeds, but was more or less frequent both in the country and in towns at some distance. So that its cause and the means of its propagation, whatever they might be, were not peculiar to one place, nor did they seem to depend upon local situation or circumstances."

In the beginning the epidemic affected chiefly those in better social position, but as it progressed it " promiscuously seized women of all constitutions and temperaments, for the strong and the weak, the robust and the delicate, the old and the young, the married and the single, those who had easy and those who had difficult labours, were all equally and indiscriminately attacked. Many of them fell victims to the disorder whose situation, circumstances, and precautions might have been expected to exempt them from it, if any care could have availed to that end." The next sentence is of extreme importance. The italics are our own.

" In towns so large as Leeds there are never wanting cases of infectious fevers, but at the time alluded to no disease was so prevalent as to deserve the name of an epidemic, *except erysipelatous inflammations which prevailed during the whole period of the puerperal fever and in many cases were of a very malignant kind, insomuch that I do not recollect to have ever seen worse cases of erysipelas than at that time.*

" This circumstance is the more worthy of note because it has been observed in other instances of puerperal fever. Dr. Gordon remarks that ' these two epidemics began in

Aberdeen at the same time and afterwards kept pace together; they both arrived at their acme together, and they both ceased at the same time.'"

As Hey was surgeon to the Infirmary and also to the House of Recovery (fever hospital) he must have been in the thickest of the fight so far as erysipelas was concerned. As a consultant he doubtless saw some of the worst cases in private practice. He was also engaged in midwifery practice! In those days, also, nurses and midwives moved about amongst infected and uninfected cases with a recklessness begotten of complete ignorance, and friends and fomites would help in various ways to convey infection. It can hardly be doubted that the two epidemics were really one.[1]

The story told in the book is tragic and terrible. A lady, living perhaps in a detached house in a healthy district, would have an easy and natural delivery—all would seem well for two days. Then would come a rigor and high fever; symptoms of acute peritonitis would develop; and in less than forty-eight hours from the onset she might be dead. Of the first fourteen cases which he saw in his own practice, eleven died; one died within eighteen hours of the onset.

Mr. Hey does not profess to record all the cases that he saw, but thirty are given in more or less detail.

The onset of the disease was observed at various times from twenty-four hours to six days. In one case it happened in seven hours. Usually, however, it was observed in about forty-eight hours after delivery. A rigor was commonly the first symptom, but was sometimes absent. Violent pain and tenderness were early and prominent symptoms, but the pain was paroxysmal and intermittent, and was liable to be confused with "after-pains." Headache and giddiness were common, but the mind usually remained fairly clear, and delirium and unconsciousness did not occur till shortly before death. The tongue was generally moist and soft, covered not unfrequently with thick white or brownish fur, but not encrusted with the "dry brown fur of typhus." (In those days of course no

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[1] In his recent valuable *Milroy Lectures* Dr. W. Williams refers to this epidemic, and to Mr. Hey's difficulty in tracing its origin, but does not refer to the partial solution which is found in the book, or the prevalence of erysipelas. See *Lancet*, July 2, 1904, p. 5.

discrimination was made between typhoid and typhus.) The pulse often reached 140 or 150 in a few hours. The expression was anxious, the milk was suppressed, and vomiting came on early, especially in the worst cases.

The lochia were variously affected, sometimes being scanty, sometimes copious. The uterus was enlarged and exquisitely tender, and abdominal distension soon became marked. We notice no mention of fœtor of the lochia in any case. This is interesting. Dr. Whitridge Williams[1] draws attention to the fact that fœtor is absent in streptococcic infection. Finally, in fatal cases, the patient sank into an asthenic condition, with restlessness, vomiting, hiccough, clammy sweat, and imperceptible pulse. Diarrhœa also preceded death. There are no post-mortem observations recorded.

In the cases which were bled "the blood was almost invariably covered with a thick coat of size, and the crassamentum was remarkably fine."

Two or three cases may be referred to in illustration.

Case I.—A young married lady, living in an open and healthy situation at a little distance from the town, was delivered of her first child on December 9, 1809, after a natural and easy labour. On the 11th she was seized with a rigor. She was treated with purgatives, salines, and opiates, and temporary alleviation followed. Then came relapse, with abdominal pain and distension and obstinate diarrhœa. Death occurred on the tenth day after delivery. Much transient relief followed the use of purgatives on more than one occasion.

Case IV.—A robust lady was delivered of her first child on Sunday afternoon. She was taken ill on Tuesday at 2 a.m. suffering from very severe pain, rapidly increasing abdominal distension and vomiting, and she died 35 hours from the onset.

Case VI.—Mrs. W., viii.-para, was delivered on January 26, 1810, at midnight. Labour was quick and natural ; 49 hours later she had a rigor with abdominal pain and rapid pulse, and 48 hours after this she died.

Strange to say, Mr. Hey did not feel able to express a

[1] *Obstetrics*, p. 778.

definite opinion on the question of the infectious nature of the disease. He doubted it very much, but he says :—

" It was my custom, however, to use such precautions in my attendance on patients, as to render it impossible for me to convey infection to them ; and if anyone would take the same trouble he might practise safely were the disease as infectious as Dr. Gordon represents it to be. It was an invariable rule with me never to attend a patient in childbed, in any article of clothing which had been in the presence of one affected with the puerperal fever, nor without washing repeatedly such parts of my person as could have been exposed to infection. This trouble I took for the satisfaction of my own mind and the safety of my patients, though not convinced that it was necessary ; but on so important a matter I worked for perfect security under any supposition."

This seems to us to be a good illustration of the difference between *security* and *safety*. We might add that it is not an uncommon experience to-day in the presence of puerperal mischief for the assurance that " every possible precaution has been taken," to be disproved by the simple fact that infection has occurred.

We have left till last what the author would have put first. The chief object of the book was to show how puerperal fever could be cured, or, to use his own words, " to show the insufficiency of the means which had been usually recommended for its cure, and to elucidate that method of cure which proved invariably successful whenever it was fairly tried." His treatment was an extension of that of Dr. Gordon in his work on puerperal fever. " The method of cure consists in large evacuations by bleeding and purging, and although other remedies may sometimes be useful auxiliaries, these are indispensable ; and they alone will generally be found sufficient if they are employed in a proper and seasonable manner."

The most essential thing was to bleed early enough and copiously enough, and to purge sufficiently. Hey says that when called at an early period he seldom took away less than 24 ounces of blood, and that if the commencement of treatment was delayed for 8 or 10 hours then 30 or 40 ounces were taken, and in one instance more than 50 ounces. " If the pain and soreness of the abdomen are not removed or very materially

alleviated in 6 hours the bleeding ought to be repeated, nor should a considerable degree of faintness or even a *deliquium* make us suppose that fresh bleeding is either unsafe or unnecessary. In short, I know not from any experience of my own, that scarcely any other limit should be put to the quantity of blood, than the removal or considerable diminution of the pain ; provided all that is requisite be drawn within 12 hours of the first evacuation."

The author had the courage of his convictions. Here is an example.

Case 20.—A young and healthy primipara had a natural confinement on June 4, 1812. On June 9 she had severe pain and abdominal tenderness, and pulse 134. She was bled to 30 ounces at 4 p.m., and had a cathertic mixture with antim. tart. prescribed. At 10 p.m. 10 ounces more were taken. On June 10 at 10 a.m., 11 ounces. On June 11 at 4 p.m., 15 ounces, and at 10 p.m. she was cupped. On June 12 she had 10 leeches applied, and on June 15, 8 leeches. In all about three pints and a half of blood were taken. After this she progressed to recovery, but was slow in regaining her strength.

Mr. Hey says that after adopting this treatment all his cases recovered except three. One of these was not bled enough and another was consumptive.

Whether the remaining cases recovered because as time went on the virulence of the infection had become attenuated, or whether the withdrawal of large quantities of blood increased the germicidal powers of what remained, the reader must judge. The manner in which the patients survived their bleeding and purging is remarkable. Unfortunately other observers had not the same success. William Hunter used to say of puerperal fever cases "treat these in what manner you will, at least three out of every four will diè." [1]

Few things in medical literature have more permanent interest than pictures which a careful observer draws of a series of cases which he has himself watched at the bedside. Long after his pathology is obsolete and his methods of treatment have been abandoned, the records, which he has made of what his own eyes have seen, and his own hands felt, retain their value, which often increases as years pass

[1] Williams : *Milroy Lectures, loc. cit.*, p. 4.

by ; for the conditions, under which he practised, may never be repeated and circumstances arise which modify the course and manifestation of disease as seen in later times. Nearly a century has passed since the period of this epidemic. It falls to the writer's lot to see a good deal of the condition of obstetric practice to-day in the city of Leeds and to know what happens within the Infirmary. He reads Hey's pages with a sense of profound thankfulness for all that a hundred years of scientific work have done to render such an epidemic as this entirely unknown to the present generation, but also with a keen sense of how much remains to be done in relation to the prevention of puerperal infection.

MEDICAL PIONEERS.

PUERPERAL FEVER.

CHILDBED fever was a mystery to our professional forefathers. The general opinion was expressed in the otiose finding of the British jury, " Died by the visitation of God." Here and there, indeed, a shrewder guess was made as to the nature of the disease. In 1795, Gordon of Aberdeen wrote :—

" I arrived at that certainty on the matter that I could venture to foretell what women would be affected with the disease upon hearing by what midwife they were delivered."

Rigby taught the same doctrine, but these were voices crying out in the wilderness. To the poet-philosopher, Oliver Wendell Holmes, belongs the glory of having first demonstrated that puerperal fever was not a product of some vague " miasm " or of want of ventilation, but a specific poison conveyed from one patient to another. A short account of the facts of his life was given in THE PRACTITIONER of January, 1901. In the history of medicine his name will live by his essay on " The Contagiousness of Puerperal Fever " read before the Boston Society for Medical Improvement in 1842, and published in a short-lived medical journal entitled *The New England Quarterly Journal of Medicine ;* it was reissued unaltered as a monograph under the title *Puerperal Fever as a Private Pestilence* in 1855. In that essay, Holmes presented well-digested facts, showing that the disease occurred epidemically and could always be traced to a definite source of infection. As an example of the sort of evidence which he collected, and also as an illustration of the midwifery practice of the time, may be cited the following account given by a physician of an outbreak which occurred in his practice :—

" The time to which you allude was in 1830. The first case was in February, during a very cold time. She was confined the 4th and died the 12th. Between the 10th and 28th of this month I attended six women in labour all of whom did well except the last, as also two who were confined March 1 and 5. Mrs. E., confined February 28, sickened and died

March 8. The next day, 9th, I inspected the body, and the night after attended a lady, Mrs. B., who sickened and died 16. The 10th I attended another, Mrs. G., who sickened but recovered. March 16, I went from Mrs. G.'s room to attend a Mrs. H., who sickened and died 21st. The 17th I inspected Mrs. B. On the 19th I went directly from Mrs. H.'s room to attend another lady, Mrs. G., who also sickened and died 22nd."

Speaking of the evidence brought forward by him, Holmes says: "No negative facts, no passing opinions, be they what they may or whose they may, can form any answer to the series of cases now within the reach of all who choose to explore the records of medical science." The following passage shows the intensity of the human feeling which animated his scientific researches : "It is as a lesson rather than as a reproach that I call up the memory of these irreparable errors and wrongs. No tongue can tell the heart-breaking calamities they have caused ; they have closed the eyes just opened upon a new world of life and happiness ; they have bowed the strength of manhood into the dust ; they have cast the helplessness of infancy into the stranger's arms, or bequeathed it with less cruelty the death of its dying parent. There is no tone deep enough for record, and no voice loud enough for warning. The woman about to become a mother, or with her new-born infant upon her bosom, should be the object of trembling care and sympathy wherever she bears her tender burden, or stretches her aching limbs. The very outcast of the street has pity upon her sister in degradation when the seal of promised maternity is impressed upon her. The remorseless vengeance of the law, brought down upon its victims by a machinery as sure as destiny, is arrested in its full at a word which reveals her transient claims for mercy. The solemn prayer of the liturgy singles out her sorrows from the multiplied trials of life, to plead for her in the hour of peril. God forbid that any member of the profession to which she trusts her life, doubly precious at that eventful period, should regard it negligently, unadvisedly or selfishly."

After formulating his conclusions, he says : "The time has come when the existence of a private pestilence in the sphere of a single physician should be looked upon not as a misfortune but a crime."

So bold a divergence from the beaten track of medical

opinion on the part of a young man was naturally resented by the leaders of the profession as an offence of the nature of *lèse-majesté.*

Hodge, of the pessary, and another great authority, Meigs, came forth like twin Goliaths to crush the presumptuous David. Hodge declared dogmatically that "you can never convey, in any possible manner, a horrible virus so destructive in its effects and so mysterious in its operations as that attributed to puerperal fever." Meigs pronounced with the authority, but something of the obscurity, of an oracle, that "in the propagation of typhoid fever, they could have no more to do than with the propagation of cholera from Jessur to San Francisco and from Mauritius to St. Petersburg." Hodge begged his students to divest their minds of the dread that they could ever carry the "horrible virus"; and Meigs solemnly said : "I prefer to attribute them (namely, the deaths) to accident or Providence, of which I can form a conception, rather than to a contagion of which I cannot form any clear idea."

Davis slew both giants with the sling of satire. He appealed to medical students not to be deceived by the statements of the two distinguished professors, which seemed to him to encourage professional homicide. He added : "They naturally have faith in their instructors, turning to them for truth, and taking what they may choose to give them; babies in knowledge, not yet able to tell the breast from the bottle, pumping away for the milk of truth at all that offers, were it nothing better than a professor's shrivelled forefinger." In his booklet entitled *A Hundred Days in Europe*, Holmes relates that at dinner somewhere he sat next to a successful gynæcologist who had saved some hundreds of lives in his operations, and he asked : "Which would give the most satisfaction to a thoroughly humane and unselfish being, of cultivated intelligence and lively sensibilities : to have written all the plays which Shakespeare has left as an inheritance for mankind, or to have snatched from the jaws of death more than a hundred fellow creatures, and restored them to a sound and comfortable existence ?" In regard to this question Professor Osler once said there was no one who could answer it so satisfactorily as Holmes himself, and expressed a curiosity to know from which the "Autocrat" derived the greater satisfaction—

the " Essay on Puerperal Fever," which had probably saved more lives than any individual gynæcologist, or the " Chambered Nautilus," which had given pleasure to so many thousands. The journal in which this question was asked reached Holmes, who on January 21st, 1889, wrote to Professor Osler as follows :—

" I have rarely been more pleased than by your allusion to an old paper of mine. There was a time certainly in which I would have said that the best page of my record was that in which I fought my battle for the poor poisoned women. I am reminded of that essay from time to time, but it was published in a periodical which died after one year's life, and therefore escaped the wider notice it would have found if printed in the *American Journal of the Medical Sciences.* A lecturer at one of the great London hospitals referred to it the other day, and coupled it with some fine phrases about myself which made me blush, either with modesty or vanity, I forget which."

" I think I will not answer the question you put me. I think oftenest of the 'Chambered Nautilus,' which is a favourite poem of mine, though I wrote it myself. The essay only comes up at long intervals. The poem repeats itself in my memory, and is very often spoken of by my correspondents in terms of more than ordinary praise. I had a savage pleasure, I confess, in handling those two professors—learned men both of them, skilful experts, but babies, as it seemed to me, in their capacity of reasoning and arguing."

In 1893, at a dinner of the American Gynæcological Society in Philadelphia, a letter from Holmes was read, in which, referring to his writings on puerperal fever, he said : " I think I shrieked my warning louder and longer than any of them, and I am pleased to remember that I took my ground on the existing evidence before the little army of microbes was marched up to support my position."

This not inaptly expresses the service rendered to humanity by Oliver Wendell Holmes in the matter of puerperal fever. It was a very great step in advance to convince men of the fact of its contagiousness. But it was not a solution of the problem. That was reserved for another who, less fortunate than Holmes, was without honour in his lifetime and died, a disappointed and broken man, in a madhouse.

Ignaz Philipp Semmelweis was born at Budapest in July, 1818. He studied medicine at the university of his native city and also in Vienna, where he took his doctor's degree in 1844. As a student he had attracted the favourable notice of Rokitansky and Skoda, and it was his first intention to devote himself to medicine. Being, however, appointed assistant in the maternity department of the Vienna General Hospital, then under Klein, he gave himself to the study of women's diseases. At that time the department was devastated by puerperal fever, the deaths never being less than 5 and often reaching nearly 8 per cent., sometimes much higher. In the period from October 1841 till May 1843, of 5,139 women confined in the maternity 829 died, a mortality from childbed fever of more than 16 per cent. Besides Klein's clinic there was another of which Bartsch was the head. In both alike instruction was given to medical students and to midwives, and as long as this arrangement continued there was no marked difference in the death rate. By an order of the Government, however, Klein's clinic was reserved for students and that of Bartsch for midwives, and before long it became evident that the mortality in the former was largely in excess of that in the latter. In the period of six years, 1841 to 1846, the death rate in the students' clinic was 9·29, while that in the other was only 3·38. The matter was investigated by several commissions of inquiry, but they failed to discover the cause. So sinister was the reputation of Klein's clinic that women who found themselves in it gave themselves up for lost and begged to be sent home. Every day priests administered the last consolations of religion in the fatal wards, the fact being notified by the ringing of bells. Semmelweis says :—

" I myself was terror stricken when I heard the sound of the bells at my door, a deep sigh rose in my breast for the unfortunate mother, who was the victim to a cause hitherto unknown ; this worked on me as a fresh incentive that I should, to the best of my ability, endeavour to discover the mysterious agent, and a conviction grew day by day that the prevailing fatality in No. 1 Clinic could in nowise be accounted for by the hitherto adopted etiology of puerperal fevers.[1]

[1] Quoted by Dr. Theodore Duka in his little monograph, entitled *Childbed Fever; Its Causes and Prevention* (Hertford: Printed by Stephen Austen & Sons, 1888), on which this brief account of Semmelweis is founded.

He saw that it could not be explained by the " atmospheric, cosmic, or telluric influences " to which it was generally attributed, for the mortality was confined to certain wards whose conditions in these respects differed in no way from the others and from private lying-in rooms in the city. Overcrowding could equally be excluded. Semmelweis observed that, while patients in Klein's clinic who had been in labour for 24 or 48 hours were doomed to almost certain death, there was no unusual mortality among cases of protracted labour in Bartsch's wards. He noted further that among women delivered before admission to the hospital the death rate was insignificant. As to all this, Semmelweis says :—

" The fatal termination of almost all the cases of protracted labour, and the immunity from fever in those who were admitted after delivery, seemed to controvert the theory that the fatality of No. 1 Clinic was to be attributed to local endemic causes, as was suggested. Again, when I consider the wholesale attacks of patients lying side by side, a circumstance not noticed in the other clinic where the treatment was in no way more skilful or more conscientious ; lastly, the disfavour with which all those were looked upon who were in any way connected with the unfortunate clinic ; all these things engendered a state of mind which rendered my life anything but enviable."

Giving up his appointment for a time, Semmelweis visited the maternity hospitals of other countries, especially those of Great Britain. On his return to Vienna he heard of the death of a friend, Professor Kolletschka, who had succumbed to the results of a dissection wound which caused phlebitis, with pleurisy, pericarditis, peritoneal and cerebral complications, and secondary abscesses. The case made a deep impression on the mind of Semmelweis from the striking similarity of the symptoms which he had so often had occasion to observe in fatal cases of puerperal fever. Reflection on the case of his friend revealed to him in a sudden flash of light the real nature of childbed fever. The students who attended Klein's clinic were much engaged in the study of practical anatomy, and they came to the lying-in wards straight from the dissecting room after simply washing their hands with soap and water. The conclusion was irresistible, that they conveyed on their

hands a poison which they introduced into the body of the parturient woman, and in this way septicæmia was produced in the same way as had occurred in the case of Kolletschka.

Semmelweis saw that a newly delivered woman is in the position of a patient with an open wound, and that puerperal fever is, in fact, produced by infection through the raw surface of the uterus. Hence it is claimed for him by no less an authority than Hueppe that he was the true begetter of the aseptic treatment of wounds. But he was far in advance of his day, and though his views found powerful supporters, they were strongly opposed by Scanzoni and other leading authorities. It must be admitted, too, that Semmelweis seems to have been deficient in moral backbone. While complaining bitterly of persecution, he had little stomach for the fight which is forced on every pioneer of new truth. It was only with difficulty that he could be induced to bring his views before the medical profession, and for many years he allowed his enemies to denounce him without attempting to reply. It was with great reluctance that towards the end of his life he produced the book in which his views are fully set forth. He had no chance of getting a professor's chair at Vienna. Moreover, as a Hungarian he was looked upon with suspicion and disfavour by the Austrian Government. Disappointment and stress of politics finally drove him from Vienna. After a time he was appointed to the chair of midwifery in the University of Budapest. In that position he was able to speak with greater authority, but petty annoyances to which he was subjected proved too much for his overstrung temperament, and he had finally to be placed in an asylum at Vienna. There he died on August 17th, 1865, in the forty-seventh year of his age. The direct cause of death was, by a coincidence of which there are not a few examples in medical history, that form of blood poisoning whose nature he had done so much to elucidate. Before mental derangement had manifested itself, he had wounded his hand in operating on a new-born infant. The wound gave rise to an abscess, and general infection supervened. His body was taken to its last resting place from the very hospital in which he made his memorable discovery.

Notes by the Way.

Childbed Fever. THE present number of THE PRACTITIONER is devoted to the discussion of the pathology and prevention of a disease, which, from the social as well as the individual point of view, is one of the most distressing with which the medical practitioner has to cope. It destroys the woman in the moment of joy which follows the dark hour of travail ; it leaves the infant helpless at the very time when it most needs a mother's care ; it too often leaves the father embittered against fate, and sometimes even against the child which is the innocent cause of his bereavement. Regarded in its social aspect, childbed fever is still, notwithstanding all that has been done to mitigate its ravages, a scourge which strikes at the very foundation of family life, and which, in conditions by no means inconceivable, might become a serious public danger. It may seem strange that a disease, of which the causation has been so thoroughly worked out, and which theoretically would appear to be readily preventable, should still to so large an extent defy the means of prevention available. Dr. Berry Hart's suggestion that this may be partly due to the too frequent use of forceps, to blind trust in antisepsis, and to excess of zeal in the use of manipulative methods of separating the placenta and membranes, is worthy of the most serious attention. The antiseptic fanatic may, of course, do much harm ; but there is an opposite extreme which is probably still more mischievous. If practitioners of the younger school are apt to see bacilli in unlikely places, as Russian admirals see torpedo boats, and wildly fire on the supposed enemy with strong disinfectant douches, some of the older men trust to Nature, or rather to luck, and do not think it necessary to keep a close look-out.

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Septic Midwives. BUT the true cause of the continued prevalence of childbed fever is the ignorant, careless, and often septic midwife. It is at the suppression of this source of danger to poor lying-in women that the Act which will come into force on April 1st is aimed. That legislative measure, it may be remembered, was opposed

by a section of the medical profession; but now that it has become law, the bulk of its members may be counted upon to give their loyal co-operation in making it effective. It is unfortunate that no provision is made in the Act for the payment of medical practitioners called in to help midwives out of difficulties; but there can be no doubt that so manifest an injustice will speedily be redressed. The action of the Central Midwives Board will be powerfully reinforced by that of the British Medical Association, and the Government will scarcely care to take upon itself the responsibility of endangering, by reluctance to deal with a comparatively trifling financial problem, the operation of an Act which it has practically acknowledged to be of the highest importance for the public safety. Although, as Dr. Cullingworth points out, there may be some danger of giving too much prominence to this question of fees, it would, in our opinion, be still more dangerous to treat it as of no importance. The doctor, who is always being reminded that he is a philanthropist by profession, may be forgiven if he sometimes remembers that he does not live by philanthropy. The State and the public need to be reminded that the medical profession is the only one whose efforts are steadily directed to the suppression of its own means of livelihood. It is labouring to destroy disease, and thereby makes its own existence superfluous; but if it is to succeed it must live till its mission is accomplished. The public is, therefore, shortsighted in its own interest, as well as ungrateful, if it grudges the practitioner his trifling fee. Not only, however, does it expect him to work for nothing, but he may often consider himself lucky if he escapes vengeance for mishaps which he is powerless to prevent.

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Infective Nurses. As an illustration of the risks which he runs we may recall a case which occurred some years ago in the East End of London. A medical man attended a woman in labour, and used most carefully every antiseptic precaution to protect his patient from possible infection by himself or his instruments. Nevertheless, the patient became ill with puerperal fever and died. A consultant was called in, who questioned the medical man as to the details of the antiseptic precautions he

had used, and could detect no omission. The husband, greatly distressed at his wife's death, refused to pay the doctor's bill, alleging that his neglect had caused the death. The doctor could not accept this imputation, and was therefore obliged to sue for his charges in the county court. At the hearing of the case the husband gave vent to his feelings in a way that attracted attention, and led to the case being reported at length in the local newspapers. The angry widower cut out these reports, and put them in his shop window for passers-by to read : out of which further unpleasantness resulted, which we need not enter into. The point we want to call attention to is this : Some weeks after the death, and too late for the information to be of any use to him, the doctor learned that the nurse had come straight from a case of puerperal fever to nurse this patient who had died. She was a nurse chosen by the patient, and probably one who thought herself too much of a lady to wear a cotton dress like a servant.

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The Midwives
Act, 1902.

In his excellent account of the Midwives Act of 1902, Dr. Cullingworth remarks that one of the main causes of the demand for legislation in regard to midwives was the intimate connection between the uncontrolled practice of midwifery by ignorant and untrained women, and the prevalence of puerperal fever in this country. This statement will, we believe, receive the ready support of all, and more especially of country practitioners ; and will, when we remember that it has been estimated that 60 per cent., and in poor districts a larger percentage than that, of the births in England and Wales are attended by midwives, stimulate local authorities to carry out the provisions of the Act as thoroughly and speedily as possible. To put into force new legislation is confessedly a difficult matter, and it is rendered more difficult when large classes of individuals are affected. A vast army of untrained midwives has hitherto occupied the field without control or supervision, and it appears that in 20 English counties, out of 10,333, only 2,682 have shown an intention to come under the Act ; while in Northamptonshire the medical officer of the county, Mr. C. E. Paget, says that nearly 60 per cent. of the midwives prefer retiring to being supervised. Assuming that this may be taken as an

index of the state of affairs throughout the kingdom, the necessity for immediately supplying at least a fair proportion of the vacancies with suitable nurses is very great. At a recent meeting of the Rural Midwives' Association, Mrs. Heywood Johnstone remarked that there were considerable difficulties in carrying out the Act, especially in sparsely-inhabited districts, but that the work of the Association was not to alter the Act, but to help to carry it out. Resolutions were passed advocating the appointment of a committee by county councils to carry out the provisions of the Act ; the inspection under the Act by, or under the supervision of, a county medical officer of health or a fully trained midwife ; and affirming that the best form of rural midwife is a woman possessing intimate knowledge of the life of the working classes. It is clear that, if the Act is to accomplish its purpose, there must be intelligent co-operation on the part of local authorities, and financial assistance from those who have the interest of the poorer classes at heart.

*   *   *   *   *

Puerperal Fever or Puerperal Sepsis ? In this number of the journal, which especially deals with one of the most terrible diseases which attack the puerperal woman, we have followed the usual custom of using the title *Puerperal Fever.* As is well known, the view was generally held that the condition so named was a specific infectious disease analogous to scarlatina, small-pox or erysipelas, but to which only puerperal women were liable. This view now is practically abandoned, and bacteriological investigation has clearly shown that cases of puerperal fever are due to various pyogenic organisms, the chief of which are the streptococcus pyogenes, the streptococcus erysipelatis, staphylococcus pyogenes aureus and albus, the bacillus coli communis, the Klebs-Lœffler bacillus of diphtheria, and the organism of scarlatina. Others have also been described as being present. These enter the body at the site of placental separation, or through lacerated surfaces, which occur at the cervix, vagina, or vulva. The disease may therefore be referred to sapraemia, septicaemia, or pyaemia following wounds, and since with the proper use of antiseptics these have almost disappeared from surgical practice, so with proper antiseptic precautions and cleanliness, "puerperal fever" has almost disappeared from the experience of the lying-in hospitals. Since in some cases

the toxins produced by the micro-organisms are found alone in the blood, and since in others the micro-organisms and their products occur in the blood and lymph of the patients suffering from this disease, we would suggest that the title *Puerperal Sepsis* would be more appropriate, and would certainly more readily describe the true pathological condition.

* * * * *

The Father of Laryngology. IT is probable that the medical profession scarcely recognises the debt which it owes to outsiders in respect of advances in science directly bearing on its work. One of the most conspicuous instances of this—a discovery which sheds light on what was previously one of the dark places of medicine—is recalled by the interesting fact that Señor Manuel Garcia, the inventor of the laryngoscope, will complete a century of useful and glorious life on March 17. The famous master of Jenny Lind and so many other great singers is still hale in body and vigorous in mind. Laryngologists and singers throughout the world are preparing to celebrate the occasion with the customary ceremonial rites, including the presentation of a portrait by Mr. Sargent and innumerable addresses, finishing off with a banquet in the evening. Sydney Smith once complained of being preached to death by wild curates ; it is to be hoped that the distinguished centenarian will not be crushed beneath the weight of the speeches to be delivered in his honour. Among the bodies which are to address him is the Royal Society. May we venture to express a timid hope that the Society may see its way, even now at the eleventh hour, to show some faint appreciation of a discovery in which, when first communicated to it by the author, it apparently took no interest whatever ? Fortunately for medicine and for mankind Senor Garcia's invention had a more intelligent reception outside.

* * * * *

Competitions. WHEN a journal enters on a new field of enterprise, or ventures on the introduction of a new feature, it is to be expected that old subscribers and friends will not be slow to offer friendly advice or criticism on the course proposed. Our experience has not been contrary to what might have been anticipated, and we

take the earliest opportunity of thanking our subscribers for the interest they have taken in the welfare of THE PRACTITIONER. We may state that our aim has been to arouse increased interest in the monthly issues, by inviting those, who may possibly be removed from the great centres of educational activity, to take part in what we consider to be a useful method of post-graduate study, which might prove of advantage not only to themselves, but indirectly to their brethren in the profession. Nor have we been disappointed. The success which has attended our venture has been so great that it affords the most complete justification for its adoption. A very large number of candidates entered for the competition on the Treatment of Diphtheria ; nearly all the essays are of a very high order of merit, and supply conclusive proof that the writers have given considerable thought and attention to the subject, and have brought to the handling of it well-trained intellects and ripe experience. To the three questions on somewhat knotty points in medicine and surgery we have received a great many answers, most of them of an exceedingly creditable character. When we say that these essays and replies have been sent by graduates in medicine and surgery of London, Cambridge, Oxford, Edinburgh, Dublin, Durham, and Brussels, as well as by those possessing diplomas of various colleges, by men in general and in hospital practice in the three kingdoms, it will be evident that widespread interest has been awakened. The following extract from the letter of a correspondent may be taken as an example of the approval with which our procedure has been favoured :—

" I think the Competitions started by THE PRACTITIONER will have a useful post-graduate educative effect on those who take part in them. However crude the results of one's efforts, there can be no doubt of the value of occasionally reducing one's experience to writing."

We have pleasure in announcing that the best essay has been written by Dr. J. T. C. Nash, Medical Officer of Health, Southend, and that we will publish it at the earliest possible date.

The best answers to the three questions were written by Dr. Edward Harrison, of Hull. Cheques have consequently been forwarded to these gentlemen.

F F

COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the February Competitions will be announced in the April number.

a.—The Subject of the Essay for March will be

Causes of Appendicitis.

b.—Answers to the following questions are invited :—

1. What are the causes of hæmoglobinuria ?

2. In what circumstances does primary optic nerve atrophy occur ?

3. A female, aged 50 years. was admitted to hospital for careful examination and observation. She gave the following history : –Her health had always been good until one year ago, when she became slowly deaf in the right ear, this finally became complete ; there was never any discharge from the ear. During the last three months she had persistent headache, worse over the right side. Occasionally she had noticed her right leg " give way " under her, and she had fallen to the ground. About one month ago her vision began to fail. She had vomited once only during the last six months. On examination the following facts were noted. Facial paresis on the right side, and over this half of the face some anæsthesia. Double optic neuritis, with retinal hæmorrhages in the right eye. The tympanic membrane of both ears was normal. Right grasp was weaker than the left, and there was no inco-ordination of the movements of the hands. On walking the patient reeled to the right, but did not definitely fall. The knee jerks were both increased, but that of the right side more markedly so. Babinski's sign was elicited on the right foot, but not on the left. The muscles of the legs were somewhat wasted. The heart, lungs, and urine were normal. Medicine was administered, but the patient got steadily worse. It was then decided to operate. What operation was performed, and what morbid condition was found ?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner " Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of April, 1905. No Essay must contain more than two thousand words, and the Editor reserves the right to publish any Essay, which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions, must be marked on the top left-hand corner " Questions," and must be sent to the Editor on or before the 1st day of April, 1905.

A and B.—(1) One side of the paper only must be written on.

(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

ON SOME OBSCURE CASES OF CANCER OF THE STOMACH, IN WHICH THE MAIN SYMPTOMS HAVE BEEN UNCONNECTED WITH THAT ORGAN.

By G. NEWTON PITT, M.D., F.R.C.P.,
Physician to Guy's Hospital.

THE symptoms produced by malignant disease in the stomach present many variations. They vary very much with its site. When the growth originates at the pylorus, it tends sooner or later to interfere with the escape of the stomach contents through this orifice, and ultimately gives rise to over-distension of the organ with increasing peristalsis. At the same time the patient begins to suffer from vomiting, loses his appetite and emaciates, until finally he reaches a condition which is quite typical ; in which an obviously tense, distended stomach can be felt, and still more easily be seen, in the otherwise lax abdomen ; while in three-quarters of the cases the nodule of growth can be felt.

Thanks to the advances of modern surgery, however, most of these distressing symptoms can be prevented by a gastro-enterostomy, even when nothing more radical can be accomplished.

On the other hand, when the growth involves the body of the stomach and leaves the pylorus free, a mass may be palpable, but there is no obstruction nor over-distension of the organ. Other symptoms, however, such as emaciation, pain, and loss of appetite, are rarely absent.

At the onset the development of the symptoms may be very gradual, and when the growth is small there may be nothing to draw attention to the stomach. It has therefore occasionally happened that a patient has died from another illness quite independent of malignant disease, such as a

strangulated hernia or kidney mischief, but at the autopsy an unsuspected cancer has been found in the stomach, which had given rise to no symptoms.

In such latent cases of cancer of the stomach, as Drs. Perry and Shaw point out in their exhaustive monograph on this subject in Volume 58 of the *Guy's Hospital Reports,* the patients die *with* and not *from* the cancer. While we must recognise that such cases may occur from time to time, they will always remain undiagnosable.

Great attention of recent years has been paid to the recognition of the earliest signs of cancer of the stomach, as the success of surgical treatment depends upon dealing with the growth as soon as possible. Fortunately, the most common site for a tumour is the one which gives rise to the most marked symptoms, viz., the pylorus, and these cases are also the ones which benefit most by surgical treatment. They can either be removed, or, if unsuitable for removal, the symptoms can be greatly alleviated by a gastro-enterostomy.

I do not propose to deal with these aspects of the question, but rather with those cases in which cancer of the stomach has ultimately been the cause of the death of the patient, yet at the autopsy the presence of a growth in the stomach has come as a surprise ; or at any rate, even when it has been realised that the patient was suffering from malignant disease, its initial site has been by no means certain.

Experience shows that the cases fall into a few definite groups, and when these are once realised it will enable an accurate diagnosis to be more often made, but by no means always, as our evidence will show.

The conclusions, however, will not be of much value to the surgeon, as the symptoms in these cases almost invariably indicate infection of some more or less remote part, and this will preclude effective surgical interference.

I propose to set forth a series of seventeen cases of cancer of the stomach in which the main symptoms were unconnected with that organ, which have been under my own care, or have come under my cognizance in the post-mortem room or in the wards at Guy's Hospital during the past twenty years ; and I wish at the same time to tender my thanks to my colleagues for permission to refer to their cases.

Symptoms of					Number of cases.
Group A.—Ascites and pleuritic effusion	-			-	7
„ B.—Matted intestine	-	-	-	-	3
„ C.—Intestinal obstruction	-	-			2
„ D.—Abdominal suppuration	-	-			2
„ E.—Profound anæmia	-	-	-	-	2
„ F.—Iliac tumour	-	-	-	-	1
„ G.—Thrombosed veins	-	-	-	-	?
					17

One of the most interesting groups consists of those cases in which there is rapid extension of the growth, when once the peritoneal surface has become infected. Minute fragments of growth tend to become loosened, and they may find their way in two directions.

First, owing to the action of gravity, they may drop down to the pelvis, into the recto-vesical or Douglas's pouch, as the case may be. Here they continue to grow, and form a sheath or plaque, which may be palpable per rectum or per vaginam, and may sometimes set up intestinal obstruction, which may be the affection for which the patient comes under observation.

On the other hand, and perhaps more frequently, they are sucked upwards by the diaphragm and proceed to grow on its under surface. In this way they give rise to ascites, and, if the growth extend upwards, to pleurisy also.

Ascites, when present, is often produced by the obstruction of the lymphatics on the under surface of the diaphragm by the cells of malignant growth. The main channels through which the lymph passes, from the peritoneal cavity are through the apertures and the lymphatics in the diaphragm ; but little if any fluid is absorbed by the omentum, abdominal wall, or intestinal surface.

It will be noted that in the history of the cases, the gastric symptoms were frequently trivial, and although in some it was realised that there was malignant disease, the involvement of the stomach was but rarely diagnosed.

I at one time thought that this group of cases was especially liable to occur in the young, but these collected cases do not

support that view, only one of the first group occurring in a patient under 50 years of age.

In connection with the whole question, I would again draw attention to the valuable information which may sometimes be obtained by a systematic examination of the glands above the clavicle, and especially those behind the left sternomastoid muscle.

The most important gland and often the only one to be involved lies behind the two lower roots of the sternomastoid, and in order to feel it, it is often necessary to make the patient cough, when it is pushed up and, if enlarged, is readily felt. It may be the only external gland infected by cancer of the abdominal cavity.

Unfortunately it is not often involved, probably in under 5 per cent. of the cases. It is impossible to determine how often as a note of its enlargement is not always made, and even then, unless it is definitely indexed, it is very difficult to discover the reference to it in the course of a long report. I have myself for some years past observed it in three or four cases a year.

Growth in this gland in more than half the cases indicates primary disease in the stomach, less often in the uterus, and exceptionally in the pancreas, liver, kidney, or ovary, etc. It may also be involved in malignant disease of the mediastinum.

Attention was more especially directed to this gland by Dr. Troisier in 1886 and 1889.[1] He showed that although but rarely involved, yet when implicated there was a great probability that the stomach was the primary seat of the growth. I have no doubt that this is due to the close proximity of the stomach to the diaphragm ; as the gland is especially apt to be involved when there is growth on the under surface of the diaphragm. Sometimes the gland on the right side of the neck is involved, and about equally frequently the glands on both sides or the inguinal glands. The left gland is involved four times as frequently as the right. If this gland is systematically examined, it will be found to be involved far more frequently than either pathological or clinical experience has hitherto

[1] *Archives Générales de Médecine*, 1889, p. 129; and Charcot, *Traité de Médecine* also Tarchetti, *Deutsche Archiv für klinische Medicin*, Band 67, 1900, gives the German references.

shown, and in several cases it has enabled us to clear up the diagnosis of an obscure case. Its importance is now fully recognised in France and Germany, but it has not yet been admitted into English text-books with the exception of Osler's, *e.g.*, no reference whatever is made to it in Allbutt's System.

The explanation why the left gland and the right pleura are the ones especially apt to be involved in cancer of the stomach is anatomical.

The gastric lymphatics may be divided up into three groups :—

1. The coronary vessels, which run from left to right and end in the glands above the pancreas.
2. The left gastro-epiploic lymphatics unite with those of the spleen, and end in glands above the pancreas and in the thoracic duct.
3. The right gastro-epiploic vessels run from right to left along the greater curvature of the stomach, joining the lymphatics of the liver behind the first part of the duodenum ; the most important branch then traverses the diaphragm to the right of the middle line, with the inferior vena cava, to enter the glands above the diaphragm on the right side. In this way cancer of the stomach may infect the right pleura.

Either side may be infected by the growth involving the under surface of the diaphragm and then spreading through.

The gland is situated at the level of the seventh cervical vertebra just above the thoracic duct as it curves over the apex of the pleura, before it joins the outer side of the internal jugular vein.

The anterior mediastinal glands, into which the diaphragm drains on the right side, pass into the right lymphatic duct, and thus may infect the right gland, and on the left side they open into the thoracic duct.

The disturbances of the lymphatic circulation produced by the respiratory movements would account for the backward infection of the sternomastoid gland from the thoracic duct on its course to the veins, and for the occurrence being only occasional.

Malignant disease only grows along small lymphatics, as a solid column, and therefore spreads by contiguity ; it is

only in the large vessels that emboli of malignant cells are carried on to a distance.

GROWTH IN LEFT SUPRACLAVICULAR GLANDS SECONDARY TO STOMACH.

Jane F., æt. 53.—Admitted under Dr. Pye-Smith, in 1888, for nodules of growth in the skin, behind the left sternomastoid and in the right axilla. There is also a tender tumour above and to the left of the umbilicus. She ultimately died, and the primary growth was in the stomach.

Among more recent cases I have noted, the retro-sterno-mastoid gland has been involved twice in connection with the stomach, once each in connection with œsophagus, mediastinum, and pancreas.

GROUP A.—SEVEN CASES PRESENTING THE SYMPTOMS OF ASCITES AND PLEURITIC EFFUSION.

(1.) *Ascites with Effusions in both Chests ; Symptoms of Intestinal Obstruction ; Carcinoma of the Stomach.*

David H., æt. 34.—Admitted under my care on June 14, 1901. Two months previously a hydrocele appeared on the left side on which Mr. Golding-Bird operated, and he went home a month later feeling well. Next day pain developed in his back, and this has continued ; it caused insomnia with occasional vomiting, and confined him to his bed. He was sent into the hospital again as a case of intestinal obstruction, as his bowels, on admission, had not acted for some days.

Present Condition.—He looks very ill, a nodular mass is palpable in the left spermatic cord, and the right is thickened.

Both bases of the chest are dull from pleuritic effusion : on the right up to the sixth rib, and on the left to the seventh.

The abdomen is very tensely distended with fluid, and dull on percussion.

Fluid was drawn off from the left chest and also from the abdomen, and contained 4 per cent. of albumen. This gave him relief.

Enemata failed to make the bowels act until the fluid was drawn off.

He was often delirious at night ; on the 17th his right chest was tapped.

The air enters only the upper parts of the lungs and very imperfectly.

Blood Examination.—Leucocytes 6250 per c. mm.

The fluid increased in the left chest and 36 ozs. were drawn off on the 22nd. A pleuro-pericardial rub was audible in the 5th space. 28th, the lungs were both much compressed by fluid. 29th, the urine reduced Fehling's solution, but only once. July 5, 25 ozs. of fluid drawn off from the left chest contained 3 parts per 1,000 of albumen.

He died on July 10th.

Autopsy.—The lungs were greatly compressed. There were 50 ozs. of fluid on the left side, 10 ozs. on the right, and 30 ozs. in the abdomen. Numerous nodules of growth over the surface of pleura pericardium, diaphragm and peritoneum. Gummatous infiltration of the testicles. Diffuse carcinoma of the body of the stomach.

(2.) *Ascites, Right Pleuritic Effusion, Carcinoma of Stomach.*

Ed. S., æt. 58, an alcoholic cabdriver, was admitted under my care on May 15, 1902. He has had abdominal pain for a fortnight and his abdomen has increased in size.

He is emaciated · and has a tense distended abdomen, 45 inches in circumference, with dulness in the flanks and a thrill can be obtained across it.

The urine, S.G. 1022, on one occasion contained albumen. There is an apical systolic bruit traceable to the axilla, P. 126.

Blood Examination. — Red cells, 5,050,000 ; leucocytes, 13,750 per c. mm.

May 20. 59 ozs. of fluid drawn off from right chest.

May 23. He is becoming increasingly drowsy, the abdomen measures 44 inches in circumference, and is very distended with fluid.

May 24. 4 ozs. of fluid drawn off from the right chest.

May 25. He died.

Autopsy.—Six pints of fluid in the abdomen. Carcinoma of stomach, with large growths in the liver and in the right kidney.

(3.) *Œdema with Ascites secondary to Carcinoma of the Stomach.*

Chas. M., æt. 67.—Was admitted under Dr. Taylor in 1895. Extremely ill with a most intense dyspnœa. There was a

history of œdema for 4 months, with pain in the abdomen after food. The abdomen was at once tapped and 30 pints drawn off on account of the intense dyspnœa. This relieved him temporarily, but he required to be tapped again ten days later, when the same amount of fluid was removed. He died next day. At the autopsy malignant disease was found in the stomach, together with extensive secondary deposits. There was general peritonitis which had coated the surface of the intestines and matted them together. The liver was extensively infiltrated with secondary growths. The heart was large and fibroid. The explanation of the intense dyspnœa was possibly partly due to growth which had invaded the hepatic veins and fungated along the inferior cava close up to the auricle.

(4.) *Ascites with Effusion into both Pleuræ, associated with Carcinoma of the Stomach, Perforation, and Fatal Peritonitis.*

Ellen B., æt. 56.—Was admitted under Dr. Pye-Smith in 1894 for ascites. She had been in the habit of drinking a considerable quantity of beer, and for a year had been suffering with vomiting, which had ceased 7 weeks ago, when her legs began to swell. She had also been losing flesh.

When admitted, the abdomen was distended with fluid. This effusion was considered to be secondary to cirrhosis of the liver. Three weeks later she developed peritonitis and died. At the autopsy, the abdomen contained 13 pints of fluid, together with some lymph. Malignant disease was found in the pyloric portion of the stomach, which was matted on to the colon; perforation had taken place, and set up a fatal peritonitis. The liver weighed 39 ozs. and was slightly cirrhotic. There was fluid in both chests.

(5.) *Ascites and Œdema secondary to Cancer of the Stomach; Pleuritic Effusion; Chronic Peritonitis.*

John E.—Was admitted under Dr. Fawcett in 1900 for ascites and general emaciation. He has been ill for 4 months with vomiting after food, and pain in the upper part of the abdomen. He has lost flesh rapidly, and was admitted with ascites and œdema of the legs and body. A month later 14 ozs. of fluid was drawn off from his left pleura. It was

thought the ascites might be due to malignant disease, but there was no evidence as to the primary seat.

At the autopsy the stomach was contracted by diffuse infiltration with carcinoma. Near the pylorus there was an irregular depressed scar which looked like an old healed ulcer. There were 5 pints of fluid in the chest and some secondary growths in the glands. The coats of the intestines were much thickened by chronic peritonitis.

(6.) *Dyspnœa, Anasarca, Bronchitis, and Double Pleural Effusion secondary to Carcinoma of the Stomach.*

John G., æt. 62.—Was admitted under Dr. Moxon in 1886 with a history of shortness of breath for a couple of months, associated with loss of flesh and latterly with dropsy. When he was admitted, the heart was irregular. There was a systolic bruit and evidences of bronchitis. The anasarca and dyspnœa increased until his death, while fluid accumulated in the chest.

At the autopsy there was a large cancerous ulcer in the stomach. The heart was enlarged, the kidneys healthy. Effusion of fluid into both pleuræ.

(7.) *Malignant Disease producing Effusion into the Peritoneum and Pleural Cavities secondary to Carcinoma of the Stomach ; secondary Malignant Stricture of Colon.*

Robert R., æt. 44.—Was admitted under Dr. Hale White in 1888 in a moribund condition, with some 11 pints of fluid in the abdomen and nearly 6 in the chest. At the autopsy, malignant disease was found in the stomach, with invasion of the peritoneum and pleura. The growth in the mesocolon had greatly constricted the lumen of the ileococcal valve and of the transverse colon.

GROUP B.—THREE CASES OF MATTED INTESTINES SECONDARY TO CANCERS OF THE STOMACH.

(8.) *General Matting of the Intestines by Growth originating in the Stomach.*

Louisa B., æt. 38.—Admitted under Dr. Goodhart in 1887. For four weeks there had been diarrhœa and vomiting with distension of the abdomen. The patient died a fortnight later when all the intestines were found matted together in a ball by a sarcomatous growth which had started in the stomach.

(9.) *Matting of the Intestines by Growth in the Peritoneum.*
Primary Growth in the Stomach.

Geo. S., æt. 65.—Admitted in 1896 under Dr. Taylor.
Ill for 4 months with vomiting and abdominal colicky pains
relieved by defæcation. Bowels sometimes loose, sometimes
constipated. Impaired resonance between the umbilicus and
the epigastrium. Visible peristalsis of the intestines. A nodule
of growth palpable between the bladder and rectum. He
suffered from vomiting and abdominal pain, and died from
exhaustion 17 days after admission. At the autopsy the intes-
tines were found matted together by a carcinomatous growth
which had started in the stomach.

(10.) *Matted Intestines secondary to Sarcoma of the Stomach.*

Jane N., æt. 41.—Was admitted under Dr. Moxon in 1879
for ascites with a large mass, which was dull on percussion,
in the lower part of the abdomen, which it was thought might
be an ovarian tumour. It was ultimately shown to be formed
by matted intestines with sarcomatous growth, which had
originated in the stomach.

Not much need be said with regard to these three cases.
They only differ from the first group in the fact that the
peritoneal infection has caused the intestines to be matted
together instead of the abdomen being distended with fluid.

It has already been pointed out that not infrequently
particles of growth on the surface of the peritoneum may
become detached, and, falling to the bottom of the pelvis,
may start a local growth (6).

Hence the great value of a local examination of the pelvis
through either the rectum or the vagina. It often at once
demonstrates the presence of malignant disease, and should
never be omitted when there is a peritoneal lesion.

Occasionally the mass may so far impede the function of or
even constrict the sigmoid flexure as to produce symptoms
of intestinal obstruction, for which the patient may come under
observation.

As in the following case, where there was a mass of growth
in Douglas's pouch secondary to carcinoma of the stomach.

Sarah I., æt. 38.—Was admitted under the care of Dr. Pye-
Smith on April 26, 1890.

She has had vomiting since the birth of a child 5 months ago.

On examination some masses of growth could be felt in the abdomen near the umbilicus. Per vaginam a mass, which was nodular and fixed the uterus, could be felt behind. The liver was enlarged and nodular with growth, which was ultimately found to be secondary to a growth in the pylorus.

Similar growths were noted in this region in Case 9.

GROUP C.—TWO CASES OF COLOTOMY FOR INTESTINAL OBSTRUCTION PRODUCED IN THE WAY I HAVE INDICATED.

(11.) *Colotomy for Intestinal Obstruction due to fixation of the Colon by Malignant Disease in the Peritoneum ; the Primary Growth being in the Stomach.*

Ellen B., æt 29.—Was admitted under Dr. Goodhart in 1888 for vomiting, and she was said "to have had no action of the bowels for six months." There had been fæcal vomiting for three days, and a mass could be felt per rectum on the right side of the pelvis. Laparotomy and colotomy were performed, but the patient only survived for a week. The stomach was infiltrated with growth, and a contracting mass of secondary deposit in the mesocolon had led to obstruction in the region of the sigmoid.

(12.) *Colotomy for Intestinal Obstruction due to Infiltration of the Peritoneum by Carcinomatous Growths, the Primary Seat being the Stomach.*

John M., æt. 58.—Was admitted under Dr. Carrington in 1886. For the previous 10 weeks he had had constipation with occasional vomiting and loss of appetite. For some weeks the abdomen had been distended. There was pain on defæcation. The motions were flattened, and there was epigastric pain. Vomiting had been constant for the past eight days. On admission he was extremely ill. Several masses could be felt in the abdomen, and per rectum a dense mass could be felt in Douglas's pouch compressing the bowel. He did not survive a colotomy, which was performed at once. At the autopsy there was a contracted stomach with dense walls infiltrated with malignant disease, and extensive deposits in the

peritoneum, which has led to the obstruction. The abdomen contained 4 pints of fluid.

We have 12 cases then, *i.e.*, about 10 per cent. of all the fatal cases of cancer of the stomach in the hospital, in which the symptoms were those of malignant disease of the peritoneum. In what proportion of them were there sufficient grounds to suggest a diagnosis of cancer of the stomach? In only three was there a history of vomiting of any duration, and in only two was there marked epigastric pain.

The question arises, in what proportion of cases of cancer of the peritoneum does the growth commence in the stomach?

Out of 121 cases of growth infecting the peritoneum which were recorded, the primary growth was in the stomach in 27, and in the peritoneum itself in 17.

Hence, in any given case of peritoneal cancer, the chance that the growth originated in the stomach is just under 25 per cent. It is my impression that the pelvic sheaths of growth are more frequently associated with growths in the liver or stomach than in the other viscera, but it is not possible to obtain definite information drawn from any large number of cases, as observation is not always directed to the question at the time.

The final conclusion is that in very few of this peritoneal group of cases is there at any time sufficient evidence to indicate that the stomach is the origin of the mischief, although in a few a collateral symptom may suggest the possibility.

GROUP D.—TWO CASES OF SLOUGHING AND SUPPURATING GROWTHS ORIGINATING IN THE STOMACH.

It must always be borne in mind that malignant disease is one cause of an abdominal abscess, and yet this is apt to be forgotten.

In these two cases large tumours in the upper part of the abdomen rapidly increased in size, due to the accumulation of pus which burrowed, and, in the first case, formed a subdiaphragmatic abscess which opened into the pleura ; and, in the other, the pus burrowed first externally and later into the stomach itself, allowing the external tract to heal.

In both cases the probability that the growth had

originated in the stomach was indicated by the evidences they presented.

In Case 4 the growth had sloughed and perforation had taken place.

(13.) Subdiaphragmatic Abscess and Empyema induced by a Sloughing Carcinomatous Growth beneath the Diaphragm Secondary to Cancer of the Stomach.

John O'Hara, æt. 49.—Was admitted under the care of Dr. Pye-Smith on Feb. 26, 1890. For six weeks he had complained of pain when the stomach was empty, which was relieved by eating. The liver was of normal size. The temperature was often raised a degree or more above the normal.

The pain persisted on and off for 2 months. A tumour, which projected beneath ribs on the left side, was considered to be an enlarged spleen. In May he had some rigors. The tumour steadily increased in size. A pleuropericardial rub developed, and he died in July.

At the autopsy the stomach was found infiltrated with growth, a secondary mass of growth had extended beneath the left side of the diaphragm. This had sloughed, and formed a subdiaphragmatic abscess, which had communicated by two apertures with an abscess in the left pleura.

(14.) Abdominal Abscesses secondary to a Sloughing Carcinomatous Growth in the Stomach.

James H., æt. 60.—Admitted under Dr. Goodhart in 1890. When admitted he was very emaciated, and there was a hard tumour with a definite edge, extending from the thorax to two inches below the umbilicus. The temperature became raised, the tumour rapidly increased in size, and finally pus was discharged from the umbilicus. The mass was then explored and drained, but the patient gradually died of exhaustion, although the abdominal incisions both healed. It was found at the autopsy that the mass had been formed by a growth in the stomach which had matted on to the liver, which was also extensively infiltrated with growth. Portions of the growth had sloughed and suppurated, causing the abscesses, which had been drained and healed up, externally, as finally the pus had discharged into the stomach.

GROUP E.—TWO CASES WITH SYMPTOMS OF PROFOUND
ANÆMIA.

Another group of cases with which we are all familiar, which sometimes give rise to difficulties in diagnosis, are those in which the main symptom is marked anæmia, and the diagnosis from pernicious anæmia is frequently by no means easy.

In malignant disease, however, the diminution in the hæmoglobin is not extreme, and very rarely is reduced to 30 per cent. of the normal. The hæmoglobin index is always less than 1, generally about ·6 or ·7, and the total number of red cells is not diminished to the extent that it is in pernicious anæmia, rarely falling below 50 per cent.; these last two being the most important points of distinction. Leucocytosis is rarely present except in cases where the growth has sloughed or there are marked metastases in other organs.

The second of these two cases was most obscure. The patient was first under observation for nervous disease owing to the difficulty in his gait, but no definite diagnosis was made. The anæmia continued to increase, and when readmitted he was so feeble that he was confined to his bed.

At the autopsy well-marked changes were found in the spinal cord, the sclerotic patches being multiple and irregularly distributed over the posterior and the lateral columns.

The nodule of growth in the stomach looked like a benign polypus, but microscopically it was shown to be malignant, and the columns of cancer cells invaded the wall of the bowel at the base of the tumour.

It is very difficult to understand how such a small mass could have produced such intense and fatal changes in both blood and spinal cord.

(15.) *Profound Anæmia.   Carcinoma of Stomach.*

Hy. S., æt. 67.—Was admitted under my care on April 19, 1901, with a history of anæmia for 2 or 3 years with progressive weakness, but 6 months ago he was able to walk 10 miles.

Syphilis 5 years ago.

Skin markedly lemon-coloured.   No teeth : liver of normal size.   No tumour palpable.   Abdominal wall, if anything, retracted.

Blood Examination.—Red cells 34 per cent. (?) ; hæmoglobin, 28 per cent. ; colour index, ·8 ; leucocytes, 2,820 per c. mm.

An excess of urobilin was noted in the urine.

He died of exhaustion on May 9th.

Post-mortem.—Carcinoma of stomach.

It is very rarely that the number of red cells in the blood is reduced to this extent by carcinoma of the stomach.

(16.) *Profound Anæmia, with Œdema. Sclerosis of the Posterior and Lateral Columns of the Cord.   A small Carcinomatous Nodule in the Stomach.*

Robert L., æt. 50.—Was admitted under Dr. Goodhart in 1895.   He had had diarrhœa and vomiting for two and a half years.   Since last year he has had some difficulty in walking. He was ataxic, and at one time it was thought he might have ataxic paraplegia, but there was always considerable doubt about the diagnosis.   A year later he again came under observation.   Most profoundly anæmic, the hæmoglobin being only 15 per cent.   The diarrhœa and vomiting increased, œdema developed, and he died from exhaustion.   Fluid was found in both pleuræ, and a very small carcinomatous growth, half an inch in diameter, was found in the stomach.

The spinal cord showed sclerosis in both the posterior and the lateral columns.

(I am doubtful whether the above hæmoglobin estimation is reliable.)

GROUP F.—CARCINOMA OF STOMACH FORMING AN ILIAC TUMOUR SUPPOSED AT FIRST TO BE OVARIAN.

(17.) A middle-aged woman, under the care of Dr. Galabin was seen by me some years ago, who presented an abdominal tumour the size of a Tangerine orange in the right iliac region at the brim of the pelvis.   This was somewhat freely movable. There were no marked gastric symptoms to attract attention, but she was very anæmic.   In the absence of gastric symptoms, and from the situation of the tumour, I concluded it was most

probably ovarian in origin. A laparotomy was performed, and the tumour was found to be a malignant growth of the pylorus.

The marked anæmia ought to have put me on my guard and suggested the right diagnosis.

GROUP G.—THROMBOSED VEINS.

The celebrated case of Professor Trousseau, who gave a lecture on thrombosis of the femoral vein in association with cancer of the stomach, is well known. Shortly afterwards he himself developed thrombosis of this vein, and this was the first evidence of the cancer of the stomach from which he ultimately died.

The occurrence is, however, a very rare one. I have seen thrombosed veins in the post-mortem room in connection with cancer of the stomach, but I only remember one case in which thrombosis of a femoral vein was noticed during life, but in this case the other evidences of cancer of the stomach were obvious.

It is doubtful, therefore, whether thrombosis should be included in our list.

Marked œdema occurred in at least three of the above cases, but did not appear as the only abnormal sign.

In two cases perforation occurred.

In several cases pyrexia was noted, but was never a prominent symptom in any of them.

In none of these cases were nodules of growth in the skin or bones an early or even a main symptom requiring explanation.

The facts adduced in this paper raise many questions of nterest. Such obscure cases form about 6 per cent. of the total ; while several of them present so little direct evidence that no more than a conjectural diagnosis can ever be given ; in others, it may be hoped that more often in the future an exact diagnosis will be arrived at.

OTOLOGY AND GENERAL PRACTICE.

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OF recent years a great change has taken place in the attitude of the medical profession towards the specialties, and towards aural surgery this changed attitude has become very striking indeed. Twenty years ago it was very uncommon to find a general practitioner who was capable of making a careful and intelligent examination of the ear, while now among the younger generation of family doctors most if not all have some knowledge of aural surgery.

It has occurred to me that to those who have taken pains to master the elements of otology certain difficulties must occasionally present themselves. Such questions, for instance, as how far it is expedient for the family doctor to undertake the treatment of ear disease and to what extent his interference should go may not always be quite easy of solution. Of course circumstances will in some cases make the correct answer obvious. Thus, if certain treatment be indicated and if it be quite impossible to have the opinion or assistance of an expert no question can arise and no reflections can be made. It may be quite otherwise when a consultant can be obtained, for even if the family attendant has done all that could or should have been done in the way of treatment, if the patient does not do well he is often made to bear the blame. It has occurred to me that a few words on these and kindred questions, from the pen of one who has heard the histories of many ear cases as stated by the sufferers and their relatives, may be of some interest to those who while engaged in general practice have at the same time some knowledge of otological methods.

Before passing to the general practitioner I may perhaps be allowed to refer to a difficulty which often confronts the consultant. As is well known some forms of ear disease may require certain manipulations to be repeated at stated intervals. Let us take as an instance the employment of the Eustachian catheter. There can be no doubt that many general practi-

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tioners are perfectly well able to introduce this instrument while others have not been in the habit of employing it. When the consultant has occasion to recommend repeated catheterisation of the Eustachian tube he often finds himself in a dilemma, more particularly if the patient asks whether the treatment can be carried out at his own home—often be it remembered far away from the scene of consultation. If he says "Yes," he may put the family attendant in a very awkward position if the latter has never used the instrument. If he answers in the negative his motives may very easily be misconstrued, more particularly if it turns out afterwards that the patient's doctor has some knowledge of otology. I have merely used this one instance as an example, but many other similar difficulties are encountered by the aurist—difficulties which would be entirely obviated if a note were received from the family attendant stating how far he was prepared to go in the direction of treatment or whether he desired the consultant to take full charge of the case. Having ventured to touch so far upon the delicate question of the relations between patient, doctor and consultant, may I go one step further and suggest that patients' interpretations of the statements made by the latter are not always quite trustworthy? Of course sometimes inaccurate accounts of words used are maliciously given, and against the mischief maker of this class none of us are safe. This apart, however, there seems to a special liability on the part of the victims of ear troubles to erroneous impressions as to opinions expressed. Of course deafness to some extent accounts for this feature, but it cannot be thus entirely explained. It almost seems as if the patient often enters the consulting room with a preconceived idea as to what is to be said and subsequently believes it has been. One of the most common delusions —if I may call them so—of this kind is expressed in the phrase put into the consultant's mouth: "If you had only come sooner I could have done something for you." Whether it is ever well to make such a suggestion is doubtful, but it is positively wrong to do it in the case of an incurable malady, such, for instance, as oto-sclerosis. I remember well thinking most uncharitable thoughts of others because I had been told that they had employed this phrase in such cases. After a

time I was proportionately horrified when a lady whom I had seen years before, and in whose case, as my note-book showed me, I had given a very bad prognosis, in stating her history announced that my verdict at her first visit had been that she was then hopelessly deaf, but that if she had only come to me a little sooner I could have cured her. Needless to say this, although told in good faith, was quite inaccurate as I hastened to explain. I have, however, since this episode, ceased to think uncharitably of those among my colleagues who are reported to have said the same thing.

Let me now turn to a consideration of the question how far it is expedient for the general practitioner to take sole charge of an ear case. Obviously the answer will depend upon various circumstances, such as the amount of knowledge and skill possessed by the doctor, and the possibility of having a consultation with an expert. Given, however, the necessary proficiency on the part of the attendant, I do not think that it is always or even often desirable to dispense with a second opinion unless the prognosis be obviously favourable, and sometimes not even then. It may be well now to touch upon a few of the commoner forms of ear disease to illustrate and define the position I have just taken up.

Let us assume that the practitioner is called to a patient suffering from earache. This will probably be due to one ot the following causes : (1) boils in the meatus, (2) acute middle ear inflammation, (3) neuralgia (usually the result of a carious tooth), (4) chronic middle ear suppuration. If the pain be due to boils or neuralgia no consultation will probably be required or desirable, because in one case opening the furuncle and in the other extraction of an offending tooth will usually, at least for a time, cut short the attack. In cases of recurrent boils or if the affection runs an unduly tedious course another opinion can be sought later. In neither is either hearing or life threatened. Now in acute otitis media the position may be different, yet a mild form of this affection is the commonest ot all causes of earache. Obviously it would not be desirable to demand a consultation in every instance, but it may become very important to have done so in certain cases. The practitioner will have to be guided by the following points : (1) the general condition of the patient, (2) the amount of pain, (3) the

local appearances. A rapid pulse and high temperature, more particularly if both persist during the day, often mean that we have a serious case to deal with, but, of course, these signs may be influenced by other factors than the ear condition. A more important guide is the amount of local pain. In mild cases this symptom, although pronounced at night, may disappear during the daytime. If it persists with great severity throughout 24 hours it is more than probable that incision of the tympanic membrane will be required. Inspection in mild cases shows usually redness along the malleus and dilated vessels at the periphery, while the upper part of the drum-head is indrawn and the lower perhaps a little bulged. In severe otitis media, however, the malleus is entirely obscured by the intensity of the inflammation, and not uncommonly there is marked bulging and commencing softening as shown by a whitish tinge. Now, in a general way, I would suggest that in acute middle ear inflammation of a severe type—more particularly if it occurs in the course of such affections as scarlatina, measles, &c., when it is apt to be followed by chronic suppuration and destruction of more or less of the tympanic membrane—the opinion of an expert should be sought. I do not for a moment mean to imply that many general practitioners are not perfectly competent to perform the simple operation of incising the tympanic membrane ; nor would I suggest that in event of the necessity arising they should abstain from doing so. It will, however, if a consultant be available, be expedient to call him in for the very simple reason that all these cases do not do well and in this way reflections are avoided. I have purposely put the most important form of earache last. I refer to pain occurring in an ear which has been the seat of chronic suppuration. Every such case should be looked upon as dangerous, and there can be no doubt of the propriety of calling in an aurist, as the questions to be solved often tax the experience and knowledge of an expert to the utmost. Here, too, the matter is often of vital importance to the patient, for the prompt performance of a mastoid operation may be necessary to prevent the supervention of intra-cranial complications. It may be urged here that many doctors are now surgically qualified to undertake the treatment of such cases, and no doubt this is true, but I

cannot help thinking that even the pure surgeon—unless he be also an otologist—will do well to hold his hand until he has consulted with an aurist as to the exact form of operation which it will be best to adopt in a given case. For example, if pain comes on in an ear which has been discharging only since an acute attack some months previously we may find (1) a small pouting perforation, (2) a great quantity of non-fœtid discharge. In such a case it may occasionally be sufficient to enlarge the opening, although more commonly it will become necessary to drain through the mastoid. Generally here the old operation of opening the antrum is preferable to what is termed the radical method which implies removal of the posterior meatal wall and clearing out the tympanum, because the former holds out a good prospect not only of curing the discharge but of retaining, or rather recovering, the hearing power. In cases of old standing otorrhea, on the other hand, with fœtid discharge from the attic the radical operation is preferable, but whether after it the hearing will be better or worse we cannot often say. We may, however, expect that if the ear has previously heard well it will run considerable risk of being worse after a radical operation.

Again, let us assume that the patient comes complaining of deafness with perhaps tinnitus, feeling of weight and possibly giddiness. In such a case it is useful to know that in all probability if the symptoms have come on suddenly they are due either to some impacted matter in the meatus or to an affection of the labyrinth. In the former case the practitioner will generally be able to do all that is required with drops to soften the inspissated material and a syringe properly used. I fear that the pernicious practice of syringing, on the assumption that there is wax present without inspection, is still far from obsolete, but such a *faux pas* could only be committed by one ignorant of all otological methods. Assuming that the practitioner finds an ear in which the calibre is almost obliterated by exostoses and sudden deafness has supervened while bone conduction is preserved, he may either conclude that wax or epithelium has become impacted in the chink, and by using a strong light may be able to see it or that swelling of the exostoses has caused complete obliteration of lumen. These

cases are sometimes very troublesome, and if a consultant be available it may be expedient to utilise his services. So far as I have seen, everything eventually comes right, but the sufferers are often much worried and very impatient. Neither must the practitioner forget that exostoses may be associated with chronic middle-ear suppuration. In sudden labyrinthine deafness, while it may for various reasons be desirable to have a second opinion, this is usually by no means essential as no manipulations are required, and the remedies indicated (including hypodermic injections of pilocarpin) can be applied by the family attendant.

In patients with a history of deafness often accompanied by tinnitus coming on gradually, sometimes made worse by cold or fatigue, and less marked in a noisy place, we probably find either chronic middle ear catarrh or so-called oto-sclerosis. It would be out of place to enter here into the differential diagnosis of these two affections, which often present much similarity in their course and symptoms. It is true that in some cases we have fairly strong evidence of catarrh associated with indrawing of the tympanic membranes. Inflation then often gives relief, more particularly if it be applied during an exacerbation of deafness associated with a recent cold. In other instances of catarrh the membranes may be thickened and even atrophied in patches, but there is no evidence of indrawing, and on Valsalva's experiment air may enter the middle ear. In pure oto-sclerosis there is no thickening of the drum-head, which may even be unusually transparent, while not unfrequently it presents a delicate flamingo red, which I think is more or less pathognomonic. I have felt it right to touch upon those points because very often the family doctor is consulted at the beginning of the trouble, *i.e.*, just when the patient or his home circle is beginning to observe diminution of hearing. My advice here is to recommend at once that a specialist be seen. The prognosis is usually bad, and it is far better that this should be recognised at once, and that treatment should be suggested by an expert. In some of these cases a degree of improvement follows inflation, and in them the prognosis is somewhat better ; in others, the immediate result is that the patient is rather more deaf for some minutes. The advice I have just given is founded on the large number of

patients who have told me that they dated their deafness from some manipulation on the part of their family adviser. This tale has been so often repeated to me that I have taken some little pains to trace its origin. It is true that occasionally interference, *e.g.*, forcible syringing or even frequent catheterisation, may make a relatively quiescent case get worse, but I do not think that this is very common, nor do I think that it always explains the above-mentioned statement. So far as can be gathered, the family doctor has in these instances seen the patient while he suffered no—or at most trifling—inconvenience. Any manipulation experienced, more particularly if unpleasant, will form a definite epoch, and from this epoch dates, in the patient's mind, the disaster to his hearing. I now always explain to people who give me the above history that before any local treatment was undertaken they must have made some complaint as to ear symptoms, but this line of reasoning, although apparently convincing, does not always have the desired effect of showing that the ear trouble had begun before the interference. In oto-sclerosis even the aurist ought to be very careful not to do much in a case where the hearing is not getting worse, as if the disease be really stationary nature will have accomplished what the expert usually fails to do.

In comparatively recent Eustachian obstruction—associated or not with serous exudation—the prognosis is generally favourable, and as only good can be done by inflation these cases usually do not require consultation. Of course it must be remembered that repeated attacks of Eustachian obstruction in young people are usually due to adenoids. It would, therefore, be wrong not to remove the cause. It will often be found that if Politzer's bag be used, the improvement in hearing is so great that the parents refuse to permit the removal of the adenoids, and as a result each attack leaves the patient a little deafer than before—this sometimes being only realised when too late.

We are now naturally led to the question whether the family doctor should remove adenoids. This will of course depend upon his proficiency. If he can make sure of clearing out all the lymphoid tissue in an efficient and careful manner, it seems to me that he will be well advised to undertake this operation, because the prognosis is so satisfactory and bad results rare.

It does not, however, do to remove only some fragments and rest content with this, as one occasionally finds has been done.

Chronic middle ear suppuration is unfortunately a very common affection, and the medical man may be consulted for the following reasons, viz., (1) discharge, (2) deafness, (3) pain. The dangers of this affection are now well recognised, and I am not quite certain that they are not somewhat exaggerated. On this point, however, it is very difficult to arrive at a definite conclusion, because it appears to me impossible to get statistics. No doubt private patients, who as a class are more cleanly than those visiting hospitals, are less commonly affected by intra-cranial complications. As to the risks, much will depend upon the exact condition as discovered by careful examination. There is now a tendency to perform a radical mastoid operation in all cases which resist treatment for, say, a year. It must, however, be remembered that this operation is a serious one, and that after treatment is often prolonged while it does not by any means always effect a complete cure. Moreover, if the hearing has been previously good we may find it much impaired by surgical interference, while, conversely, if bad it may be improved. In other words we cannot tell what the result as to function will be in any case. When consulted for discharge or deafness the practitioner will do well to have a second opinion under the following circumstances: (1) perforation of Shrapnell's membrane, (2) large perforation with foetid pus coming from the attic, (3) granulations or polypus, (4) the presence of a fistula, (5) history of occasional attacks of pain, (6) facial paralysis, (7) the presence of dead bone.

It is only in cases of clean cut perforations occurring in the lower part of the membrane with little discharge and absence of foetor that he will be well advised to assume all responsibility provided circumstances permit of a consultation.

As these remarks are only intended for practitioners who have mastered the rudiments of otology, it is almost unnecessary to touch upon the subject of foreign bodies. We do not now often meet with cases in which much injury has been inflicted by attempts at forcible extraction, unless indeed such injury has been produced by the relatives of the patient. Given, however, a case in which owing to rough handling a foreign body has

become impacted—a condition always accompanied by bleeding and swelling—it may be desirable to have a second opinion. Again, the practitioner will probably prefer to have a consultation where the extraneous substance is fixed in such a way that the question of removal by detaching the auricle arises. Trauma involving the tympanic membrane is always important, and the prognosis is in many cases uncertain, whether the lesion has arisen from a foreign body, blow or fall. If an expert be readily available it may under these circumstances be judicious to have his opinion, although the treatment, apart from foreign bodies, generally resolves itself into asepsis and masterly inactivity.

I have thus endeavoured to lay before my readers the opinions I have formed upon the questions suggested at the beginning of this paper. It seems to me that the services of a consultant may be legitimately utilised for two distinct purposes : (1) to throw light upon what is obscure whether with regard to diagnosis or treatment, (2) to avoid any reflections on the part of the patient or relatives. Whether a consultation be required for further elucidation of a case is a matter upon which each practitioner must judge for himself. Everything will depend upon the amount of knowledge, practice, and experience he possesses. These qualities do not, however, always save the family adviser from blame when things do not go right, and for this reason I venture to repeat the warning I have already given, *i.e.* :—In ear cases where the prognosis is not good always, if possible, have a second opinion.

THE TREATMENT OF SCALP RINGWORM.

SOME GENERAL RULES OF PROCEDURE.

By T. COLCOTT FOX, M.B. (LOND.), F.R.C.P.,

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[With Plates XXIV.—XXV.]

GENERAL RULES OF PROCEDURE.

1. *Examination.*—At the first inspection attention should be directed to the existence of any patches on the smooth skin, to possible implication of the nails—a rare complication in this country—and particularly to the distribution of the disease in the scalp. The child should be placed in a good light, and the hairs of the scalp turned over against their set in different parts by the blade of a pair of forceps, or the deft use of the fingers. *A practitioner must be hopelessly at sea if he is unable to recognise with the eye not only the diseased stumps of obvious patches of disease, but also those occurring in less significant areas, and even isolated.* In most of the cases first seen by me the classical symptoms have been altered by treatment, and *the one unfailing resource is the recognition of diseased stumps.*

2. *Cutting Hair in Preparation for Treatment.*—The extent to which this is carried out must depend on the distribution and extent of the ringworm present, and the age, circumstances, and surroundings of the patient. Removal of the hair over the whole head is most satisfactory for treatment and for observation, and for the prevention of auto-inoculation. The scalp can be shaved under antiseptic conditions, but I prefer to keep the hair clipped to the length of about half an inch, so as to command a survey of the whole scalp, yet allow a distinction to be drawn between healthy and diseased hairs, and facilitate cleanliness and general preventive treatment.

3. *Marking out Diseased Areas.*— Mark out the diseased areas, *taking special care to locate any tiny commencing spots,* by painting with an iodine solution, or an aniline pencil. *These areas must never be lost sight of again,* as so frequently results from washing, &c., or little commencing patches make headway, and single stumps remain uncured about the head. In France

it has been customary to epilate a zone of healthy hairs around all diseased areas, big and little ; but this proceeding is irksome in many cases and unnecessary.

4. *Head Covering, Toilet Articles, &c.* — A suitable inexpensive head covering should be worn day and night made of linen or other cool material. Grocer's waxed paper is apt to be heating. It is needless to add that toilet articles used should be rigorously kept apart from other children and kept disinfected.

5. *Washing the Head.*—Subject to an occasional necessary clean-up, the less the head is washed the better. Washing does not aid the cure, and I believe it may cause dissemination of the ringworm and of coccogenic pustular infection of the follicles in certain cases.

6. *Prevention of Auto - inoculation.* — It is advisable to apply to the healthy surface some *innocuous and unirritating parasiticide,* such as carbolised vaseline or glycerine. Sabourand advocates the use of tincture of iodine diluted with three volumes of 90 per cent. alcohol or eau de cologne as the application of choice. The latter preparation, he says, also helps to disclose diseased areas not hitherto noticed. If diluted with four volumes of spirit, it can be applied four times weekly. Iodism is rare ; but in certain sensitive children the application may cause restlessness and dreaming, and then a less penetrative application of one grain of iodine and of iodide of potassium in the ounce of water may be substituted. Long continued applications of iodine and other chemicals, like incessant washing with strong soaps, are apt to excite an obstinate epidemic desquamation. When once the diseased areas are under efficient treatment, it is remarkable how seldom auto-inoculation occurs.

THE CHOICE OF A METHOD AND REMEDIES.

Parasiticide Treatment.—The first point to clearly understand is that there is no lack of substances which have the power of killing the parasitic moulds which cause ringworm. On the glabrous skin we know that, with the exception of certain chronic tropical ringworms of the inguinal region and palms and soles, the disease is readily curable (1) because the parasiticide can easily reach the fungus lying in the superficial

epidermic layers or small hairs, and (2) because the parasiticide, being usually an irritant, helps mechanically to remove the fungus by promoting desquamation. But experience teaches us that it is practically impossible, where strong hair growth exists, to make the remedy penetrate sufficiently deeply into the follicle, and likewise, through the hair cuticle, into the diseased hair.

To surmount this fundamental difficulty, various methods have been devised, such as (1) the removal of all natural oil preliminary to the application of the parasiticide ; (2) the incorporation of the parasiticide with substances—such as ether, chloroform, turpentine, petroleum, glycerine, vaseline, lanoline, &c.—which promise to facilitate the penetration of the remedy ; (3) the continuous application of the parasiticide under an impermeable head covering ; (4) the forcing in of the parasiticide by a special vacuum-producing apparatus (Abraham) ; (5) by a special electrical process known as cataphoresis. By none of these methods can we ensure success, and we have to realise the fact that, although many agents are capable of killing the fungi, we are unable, as a rule, to make them penetrate into the depths of the follicle, and to soak into the hair, with sufficient thoroughness to come to close quarters with the parasite. Only in certain young children, with hair implanted comparatively superficially, or in whom the fungus does not find a very congenial soil, is it possible to effect a cure with a purely parasiticide application, and even then it is possible that the cure is effected by detachment of the diseased hair.

In this connection I will mention two ointments. I have tried equal parts of Ung. Acid. Salicylici and Ung. Sulphuris in hundreds of cases, with most unsatisfactory results. Similarly, I have used, with almost as great a disappointment, an ointment composed of Sublimated Sulphur, ʒj, Ung. Hydrarg. Nitratis ʒij, Olive Oil, Phenol, and White Wax, of each ʒj. Examples of very similar preparations could be multiplied ad infinitum.

Treatment by Epilation and Depilation.—If we cannot destroy the fungus *in situ*, can we remove the diseased hairs bag and baggage ? A temporary cessation of growth with fall of the hair has exceptionally resulted from the continuous application of a saturated solution of boric acid in methylated

PLATE XXIV.
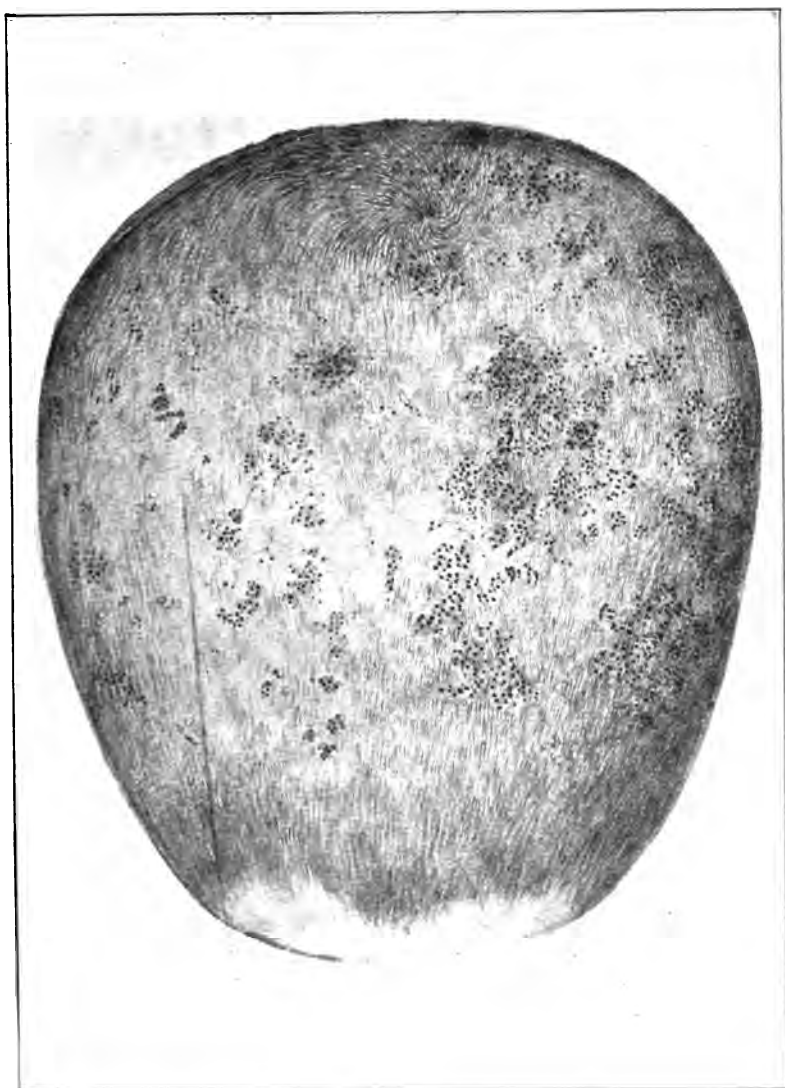
Fig. 1. *Disseminated " black dot " Ringworm caused by an Endothrix Trichophyton.*

PLATE XXV.
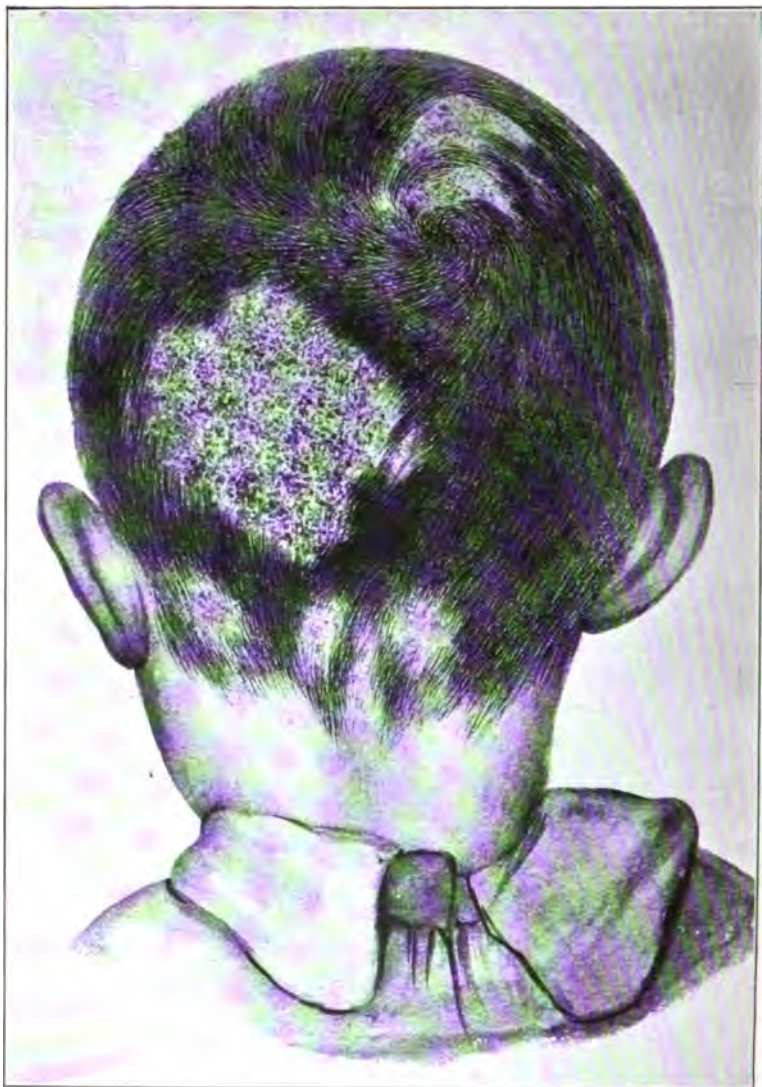
Fig. 2   " *Black dot* " *Ringworm of unusual pattern caused by an Endothrix Trichophyton.*

spirit and ether, and from the use of gas water (Aldersmith). Such happy effects, however, cannot be relied on. Then the simple plan suggests itself of carefully pulling out (epilating) all the diseased hairs, which is satisfactory with the less fragile hair of favus infection. Various plans have been in vogue, from the barbarous old wholesale method by the calotte to the modern detailed plan by forceps. In most cases and most stages of ringworm, however, the extreme fragility of the diseased hair makes this treatment futile, for the hairs break and grow up again as diseased as before. Nevertheless, I wish to insist here that epilation sometimes proves an invaluable aid to cure. When the hairs become loosened in the course of treatment they can sometimes be readily and painlessly extracted entire, often with the root-sheath adhering. I always try this proceeding from time to time. It requires a practised hand, and demands the time and patience which so many practitioners grudge. It is a common practice to forcibly remove a dried crust, and so bring away the diseased stumps ; but a large proportion are almost always broken off.

Epilation after Croton-Oil Needling.—An invaluable method of epilation, which I learnt from Aldersmith years ago, consists in *croton-oil needling*, called in Paris " l'épinglage." Aldersmith uses a special needle ; Sabouraud a watchmaker's needle of hard steel and quadrangular section, known as an " alésoir " ; I use a triangular glover's needle. The latter is lightly coated with a film of croton oil and gently insinuated deeply *into the diseased follicle,* care being taken not to pierce the skin. This operation loosens the diseased hair, which can then be frequently extracted entire with the adherent root-sheath by gentle traction. If the fragile stump breaks, it will be presently shed by the formation of a pustular perifolliculitis. This method has a wide field of application towards the terminal stages of a treatment where a few scattered stumps remain, in cases where isolated stumps occur, and in the disseminated " black dot " cases. *It will be obvious that the ability to recognise diseased stumps is essential.* This needling is infinitely preferable to destroying the hair papilla by electrolysis or the cautery.

Depilation by X Rays.—This is a method of depilation which must revolutionise the treatment of ringworm. Experimenters

have been somewhat timorous with this method. Two or three years ago Dr. Mills effected an excellent cure for me of an extensive scalp favus at the Westminster Hospital, and of late I have been sending all my cases to the Light Department, where Dr. Sale-Barker has been uniformly successful without any mishap. By a suitable dosage and selection of the rays, which can now be regulated, and their concentration on a diseased area, the hairs can be made to fall without serious damage to the scalp, and they are replaced after an interval of some weeks by a healthy new growth. From every point of view this must become the treatment for the future wherever the rays are obtainable. It is painless, and comparatively rapid and economical. All danger of infection to others is rapidly removed, and the only drawback is a somewhat prolonged period of more or less baldness. In the Municipal Ringworm Schools of Paris this method has now been definitely established by Sabouraud.

Depilation by Inflammatory Treatment.—What else can we do where the X rays are not available? Experience teaches us that our end can be obtained by setting up a requisite grade of inflammation, and we may learn our lesson by the study of the self-cure of the highly inflammatory phase of ringworm known clinically as *Kerion.*

It is of the greatest practical importance to acquire a clear conception of the kind and degree of inflammation required to effect our purpose. A too superficial inflammation, such as the eczematous, or that caused by a blister, is useless for removing the hair. On the other hand, it must not be too deep, or the dermis and hair papillæ may be permanently injured. It must not be too acute and intense or an abscess may result and scarring. We require a quiet inflammation just deep enough to cause a gradual detachment of the diseased hairs. The ideal is to limit the process to the immediate neighbourhood of the hair follicles (perifolliculitis), and it is luckily the case that the diseased follicles sometimes tend to inflame more readily than healthy ones.

The next practical point to bear in mind is that no two children's scalps react quite alike to the same irritant. Thus tar products are known to be apt to set up a perifolliculitis, and I effected a brilliant cure of a girl by setting up an inflammation

limited to the diseased follicles by rubbing in a liquid pitch soap (Liquid Pitch, 3 parts, Soft Soap, 1 part). The patient's sister would not react. A precisely parallel occurrence was witnessed in two sisters, where I used Balmanno Squire's Saturated Solution of Sulphurated Potash in Glycerine (equal parts). A strong verdigris liniment is apt to cause some necrosis about the follicles. As a rule the ideal limitation of the inflammation to the follicles cannot be secured, and the intervening skin is involved.

There are certain drawbacks to this inflammatory method. It causes discomfort, if not pain. It is unsightly and even alarming to parents, and consequently, in private practice, unless the practitioner has a strong influence, this method becomes sometimes almost impracticable. Another drawback is the occasional irritation of related lymph glands. It is obvious that the method exacts a right conception of what is needed, and that the practitioner must take infinite pains to direct the details, or disaster will follow. I have superintended this treatment in hundreds of cases, and am in a position to say that where carefully and intelligently carried out the method is most successful.

The choice of an inflammatory remedy must depend in some measure on the age of the child, the disposition and sensitiveness to discomfort and pain, the susceptibility to reaction, the size and number of the infected areas, and the urgency of a rapid cure. Certain agents—such as strong iodine, formaline, and glacial acetic acid—cause considerable pain.

The medium in which the agent is applied, whether as a pigment, crayon, liniment, or ointment, may also be varied. Pigments, for example, have the advantage that their action can be localised to the diseased areas, whilst ointments are apt to spread more or less over adjacent parts.

Keeping steadily in view the effect aimed at, it is wise to proceed carefully until the susceptibility of the child is ascertained. We can gradually increase the strength of the application until the proper effect is produced.

I will now mention some of the treatments I have thoroughly tried.

Coster's Iodine and Tar Pigment is very useful. My criticisms on it are that it is too strong for some vulnerable children, and that ulceration and scarring may take place under the adherent

black crust. Similar well-known ·pigments are those suggested by Toulmin Smith and Morrant Baker and Illingworth (Hydrarg. Iodid. Rubr. gr. iv–xv., Sol. Sodii Iodid. (1 in 4) q.s., Sp. Chlorof. ȝij–ȝiv ; Aq. ad ȝj).

Sheffield's Treatment.—Apply to the entire scalp, and more thickly to diseased patches—by means of a painter's brush—once a day, for five successive days, the following preparation :—℞ Acid. Carbolici, Olei Petrolei, āā 65·0 ; Tinct. Iodi, Ol Ricini, āā 100·0 ; Ol Rusci (German) q.s. ad. 500·0. On the sixth day wipe off with rag dipped in plain oil, clip the hair again, wash thoroughly with green soap and *soft* nail-brush, remove all scales and loose hair. On the seventh day reapply as before. When the new hair grows, apply for a few days 10 per cent. sulphur ointment, and finally for two weeks, ℞ Resorcin, Acid. Salicylici āā 16·0 ; Alcoholis, 120·0 ; Olei Ricini ad 500·0. Sheffield claimed marvellous results which it has not fallen to my lot to confirm. The application is dirty.

Frazer's Izal Treatment.—(1.) Wash the scalp thoroughly with soft soap to which 5 per cent. Carbolic Acid has been added, and thoroughly rinse away. (2.) Take a pledget of absorbent wool dipped in Waugh's purified benzine (turpentine is too irritating), and thoroughly cleanse the patches from grease. (3.) Rub in *commercial Izal oil* to each patch with a stiff short-bristled brush, preventing the oil running on to healthy skin ; stop the rubbing when frothiness is manifested ; dry the patch with wool or blotting-paper. (4.) Repeat 1, 2, 3 every third day for each separate patch. My friend, Dr. Frazer, of Romford, kindly recommended this treatment to me some years ago. It is decidedly useful in certain children who react easily, but has often failed in my hands.

Foulis's Treatment.—(1.) Rub in spirits of turpentine to the patches for several minutes until it hurts. (2.) Then rub with 10 per cent. carbolic soap, and then warm water to make a lather. (3.) Dry with a towel, and apply 2 or 3 coats of Tinct. Iodine to the patches. (4.) When dry, rub carbolised oil (1 in 20) over the head. This treatment is to be carried out night and morning. Dr. James Foulis also claimed surprising results, but the treatment has disappointed me.

These treatments fail to cope effectually with any single isolated stumps that may exist.

Chrysarobin Treatment is undoubtedly useful, and it can be applied in any strength adapted to excite the requisite inflammation in the particular child. I need not refer to the various methods of application such as are used also in psoriasis. Chrysarobin has many disadvantages. It is dirty and staining, and apt to get on the face and other parts and set up inflammation.

Formalin Treatment has greatly disappointed me. It is painful, it tends to set up an eczematous type of inflammation which is useless, and its action must be very carefully confined to definite patches.

Of *ointments* which set up a desirable grade of inflammation without pus formation, the two I consider the best are the following :—

Ung. Cupri Oleatis.

℞ Cupri Oleatis - - - - - ℥ j–℥ v.
  Olei Amygdal. - - - - - ℥ ij–iij.
  Adipem Lanæ Hydrosum ad - - ℥ j.
M. Ft. Ung.

(If oleic acid be used in its composition, a more irritating effect is produced. Chrysarobin gr. xx. may be added.

Ung. Hydrarg. Oleatis (Aldersmith).

℞ Hydrarg. Oleatis Absoluti (Corbyn) - ℥ ij–℥ ij ss.
  Adipis Lanæ - - - - - ℥ j ss–℥ ij.
  Acid. Oleici ad - - - - - ℥ j.
M. Ft. Ung.

These ointments can be progressively increased in strength, and more and more vigorously and frequently applied until the desired effect is produced. They are, however, far from being thoroughly reliable. Crusts must not be allowed to form.

Lastly, I come to two treatments which are accompanied by the formation of pus. Pus was at one time held by some to be inimical to the fungus ; but this is not the case, and pus formation is a decided drawback, and it is apt to set up impetigo and boils about the head, and to form crusts.

Salt Treatment.—Salt has been used in saturated solution and generally in ointment form with vaseline. In the latter form equal parts may be used, or stronger. Its effects are variable and somewhat uncertain, but in many children it

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excites a pustular dermatitis which is very effective, and the places recover more quickly than after croton oil.

Croton-oil Treatment.—Croton oil is painless except on patches already inflamed. After a very wide experience, I hold that this treatment is the most certain and effective we have; but, like all potent agencies, it requires most careful control, and cannot be left to inexperienced hands. It is a notable fact that it is the treatment favoured by Aldersmith, by Sabouraud in the École Lailler, and by myself in the Ringworm Schools of the Metropolitan Asylums Board. There are some variations in the way the treatment is carried out.

Aldersmith, after ascertaining the susceptibility of the child by treating one patch, gives the following directions:—(1.) Rub into a patch one drop of croton-oil, and prevent the spreading of the oil to healthy parts by using a small quantity, and protecting the healthy skin around by smearing on carbolised lanolin (1 in 8). (2.) After four hours apply to the patch a soft, sticky, small, linseed poultice, and over it a piece of oiled silk. The poultice must be fixed, for if it shifts it may disseminate the croton oil. (3.) Next morning bathe the patch, and cleanse away all pus, and reapply the croton oil and the poultice as before. (4.) The subsequent treatment will depend on the state of the patch. In any case, the inflamed surface must be kept clean and free from all pus. If the requisite degree of inflammation is not set up, repeat the course. When the desired effect is produced simply bathe and continuously poultice, keeping up the inflammation until all diseased stumps have fallen, or been extracted unbroken. Cocaine applications can be made before epilation. Boric acid fomentations retard pus formation when the patch is properly inflamed.

Sabouraud, with his large field of observation at the École Lailler of the Hôpital St. Louis, became convinced that the croton-oil treatment was the best and nearly infallible, although at one time discarded in Paris. He formerly used a crayon made with cacao butter and wax, or, in certain cases, a mixture of equal parts of sweet almond and croton oils. He directs that after testing the susceptibility of the child—(1.) A drop of croton oil is rubbed into the patch and all excess wiped away. (2.) If the inflammatory reaction is severe and vesico-pustules

form, equal parts of tincture of iodine and 90 per cent. alcohol are applied next day to mitigate the inflammation, and dry up the pustules. (3.) After three days the crusts are removed by a moist dressing, or scars may result. Thick crusting must always be prevented. (4.) The croton oil should only be applied every 12 to 15 days, and after four or five applications at least two-thirds of the diseased hairs will have gone. After that croton-oil applications are less satisfactory. (5.) Epilation of the stumps in their entirety is an invaluable adjunct.

This treatment, which I learnt from Aldersmith, I have used for many years. I apply an ointment containing 3 j of croton oil to the ℥ j of base, and this is rubbed in daily, or as often as necessary, to excite the desired degree of inflammation. Such a state is then maintained by judicious reapplication until all the diseased stumps have fallen or been epilated. All pus formation is rigorously cleansed away, and crust formation is not allowed. There is no method comparable to *croton-oil needling* for residual and isolated stumps.

THE PATHOLOGY AND TREATMENT
OF PUERPERAL ECLAMPSIA IN THE LIGHT
OF RECENT WORK.

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WITHIN the last few years many papers have appeared dealing with work on this subject, especially with regard to the pathological changes in the mother and in the child ; the chemical work on the subject is, however, still in a very unsatisfactory state, notwithstanding recent careful and exact research.

I propose to discuss first :—

The Pathological Changes in the Organs of the Mother and Child.

V. Winckel[81] was one of the first to point out the importance of a closer study of the microscopical appearance of the organs, and to try if in this way one could learn more of the origin and nature of the disease. Schmorl,[63] Lubarsch,[41] and others have demonstrated the pathological condition of the organs of the child, especially in the liver and kidney, where the chief changes are found.

Again, Fehling[20] (1899), in *Die Pathogen. u. Behandlung der Eklampsie in Lichte der heutige Anschau,* put the subject on a better footing, and advanced the practical treatment of the disease by pointing out the danger to the kidney of the child.

Jurgens,[34] Pilliet,[56] and others noted the very constant occurrence of petechiæ in the liver, and at times found cells like liver cells in the vessels of the lungs. From the researches of Pilliet,[56] Schmorl,[63] Lubarsch,[41] Pels-Leusden,[53] Prutz,[58] Sandberg and Limfors,[60] etc., the conclusion was arrived at that there was a special pathological picture for eclampsia, that it differed from the pathological appearances in uræmia, and that the fits were different from those seen in epilepsy, strychnine poisoning, and tetanus. All this was against the old theory of Frerichs[23] that eclampsia was uræmia occurring in pregnancy.

Frerichs was supported in theory by Traube and Rosenstein,[30] but they considered that in uræmia the fits were due to the poison acting in the central nervous system, while in eclampsia they were more of the nature of a reflex spasm associated with anæmia of the brain.

At one time the pressure of the uterus was held to be the paramount cause (even now it is looked upon as a very important one, but we know more about the condition of the blood, etc.), and then later it was found experimentally that in animals, pressure on the renal vein would cause a condition of stasis in the kidney, and shedding, and even necrosis of, the epithelium, and diminished urine. Still it was found, when one came to statistics, that the number of cases of eclampsia in proportion to the number of pregnancies was so small that there was probably some other agent at work ; but I think everyone must admit that pressure on the ureters must be an exceedingly important element in the causation of eclampsia.

Halbertsma[26] supported this view, and noted that in one-fourth of the post-mortem examinations of cases of eclampsia there was dilatation of one or the other ureter, and sometimes, but not so frequently, found that both ureters were dilated. Schmorl, however, says they are not more often dilated than in normal pregnancy. Still, it only emphasises the fact that the pressure of the uterus must play an important part in embarrassing the excretory organs of the mother.

The following pathological changes have been noted in the different organs of the mother :—

Kidney.—It is well to begin with this organ, as it is the changes which occur here that, more than any other point, serve to distinguish elcampsia from uræmia. With regard to *size*, there is a normal enlargement in pregnancy, but the actual size does not count for much, as Pels-Leusden[68] and Edinger[18] found that it varied considerably. The colour also is not constant. On section, the cortex is often increased in extent, and pale grey or light yellow in colour ; there may be petechiæ on the surface or in the substance, and in many cases infarcts or patches of coagulation necrosis may be seen with the naked eye. In severe cases the picture may be that of a hæmorrhagic nephritis with infarct formation and blood extravasation.

On microscopical examination the chief changes are seen in

the *convoluted tubules*, but the other epithelia may also be altered in the same way. All changes from cloudy swelling through fatty change to actual necrosis with degeneration of the nucleus may be made out; here the nucleus often shows little or no staining with the usual reagents. Fatty change may occasionally be seen in the glomerular epithelium, or there may be only a fine granular appearance; there may also be commencing hyaline change in the glomerular vessels.

Thrombosis of the capillaries and smaller vessels are frequent; also patches of necrotic cells. Liver cells have been described in these thrombi, but their appearance must be doubtful or very rare. Meyer-Wirz[44] does not mention them in eleven cases he examined. The lumen of the canals nearly always show débris—cells and casts of different kinds.

The interstitial tissue, with the exception of their containing extravasated blood, is mostly normal. Dienst,[15] however, does mention *one* case where there were signs of inflammation present, in the form of round cells in the tissues, going on to fibrous formation. Every observer agrees that there is very seldom any sign of inflammation; all the appearances in the cells are those of degeneration. Of course there may be signs of old disease; and one would expect a case here and there where the mother developed actual nephritis. Every degree of the above appearances may be seen, from simple commencing degeneration of the cells of the convoluted tubules, and nothing else, to the most severe general infarction and degeneration. As an example, in one case mentioned by Meyer-Wirz,[44] there were no naked eye changes—and albuminuria had not been detected—but microscopically there was seen degeneration and necrosis of the epithelium.

What often strikes one on examining an eclamptic kidney is the extraordinary number of red blood cells in the tissue.

In two cases of eclampsia, when I examined the kidneys, at Queen Charlotte's Hospital, there was marked degeneration of the epithelium of the tubules, and not much change in the glomeruli. In one of these cases the kidney was markedly hydronephrotic and the ureter dilated—the changes in the tubules were much the same in the non-hydronephrotic kidney, but there was in addition a patch of necrosis on the cortex.

At times Schmorl, Prutz, and others found the kidney

appearances in striking opposition to the pathological changes in the other organs.

Lubarsch [41] divides the appearances into three classes according to the severity of the lesion.

Frerichs [22] notes the importance of previous disease of the kidneys ; and at times, of course, one would expect to see the results of old disease.

As has been found, and mentioned later, a chill may act as the immediate exciting agent in eclampsia ; and it is easily understood that with some of the above-mentioned changes present, anything of this nature will cause the kidneys to become more incompetent than they already are.

The dilatation of the ureter is mentioned above, and has been noted by Halbertsma,[28] v. Winckel,[81] Lohlein,[40] and others ; and one can well imagine that in protracted birth the pressure may lead to even œdema of the kidney and further necrosis of the epithelium.

Meyer-Wirz [44] mentions one case where the dilatation of the ureter suddenly ceased at the Linea Innominata, the part between this line and the bladder being quite normal.

It is easy to understand that many cases of eclampsia must have been looked upon as acute nephritis in the past on account of the blood in the urine ; but from the appearance described, and the extravasation of blood in the tissues, it is easy to account for its presence in the urine without assuming acute inflammation. All the above-mentioned pathology points to a *degeneration* of the kidney epithelium, *not* to an inflammation.

The liver to the naked eye sometimes appears passively conjested—often it is fatty in appearance and friable. Meyer-Wirz [44] mentions 8 cases where there were necrotic areas seen hrough the surface of the liver ; in some cases necrotic areas, with grey centre and red periphery, filled with red blood cells, are found. The same appearances, or at least those closely resembling acute yellow atrophy, have been described on section (see later). Jaundice has at times been present, and petechiæ are frequent on the surface of the liver.

Microscopically there may be seen blood extravasations, large or small, widening of the capillaries, thrombi, either hyaline, fibrous, etc., or containing blood platelets. Thrombi containing

apparently liver cells have been described by Wildbolz (Dissert., Zurich, 1890); and also by Prutz, Klebs,[35] and Lubarsch.[41] Infarcts may be seen, especially under the capsule in the periportal tissue and in the periphery of the acini. In some of the cells the nuclei do not stain, and a threadwork of fibrin with extravasated red cells may take the place of the liver cells.

Dienst,[16] in some of the cases described in detail by him, mentioned albuminoid bodies in the blood vessels, and liver cells in some veins. These albuminoid bodies were also seen in freezing sections, and small similar bodies were seen in some of the cells, not staining as amyloid material does, but swelling up with acetic acid; they were probably some degenerative product.

In many cases the liver cells contain a fatty detritus and free blood cells.

Schmorl found jaundice in 10 out of 73 cases of eclampsia examined post-mortem and 71 out of 73 showed changes in the liver.

Lubarsch,[41] as with the kidney lesions, divides the liver appearances into three groups according to their severity.

Stumpf[66] likens the changes in the liver to those of acute yellow atrophy. Bell[6] describes one case where the post-mortem appearances closely resembled those found in this disease. There seems to be no definite border line between cases of eclampsia where the weight of the disease falls on the liver, and cases of acute yellow atrophy. Pregnant women seem specially liable to degeneration of the liver as seen in these two diseases.

It will be noted, if one refers to published accounts of post-mortems in eclampsia, that in some, the most marked changes are in the liver, and in the others, which are more numerous, in the kidney.* It is possible that two varieties of eclampsia may be thus made out. The cases where jaundice has been described would come under the former heading. Eclampsia may, for all we know at present, really include several distinct diseases. Both in acute yellow atrophy, in puerperal albuminuria, and in the further condition of eclampsia, one would

* In two cases I examined at Queen Charlotte's Hospital, where the kidney changes were very marked, there was not much alteration in the liver—none to the naked eye—but microscopically there was some degeneration of the liver cells.

expect to find leucin and tyrosin in the urine, and it is quite possible if the urine of more cases, and especially cases of hepatic eclampsia, were examined for leucin, that it would, at times at least, be found. Bell[6] mentions leucin in the urine of his case, and Sir John Williams in 2 cases (quoted Herman[20]).

Heart.—Epi and endocardiac hæmorrhages, and petechiæ are often present, and the muscles at times are pale and fatty looking ; microscopically, in the great majority of cases there are the usual signs of degeneration of the muscle cells ; loss of, or blurring of the cross striation, with granular and fatty change. Hypertrophied muscle cells at times are seen, and minute intrafibrillary thromboses ; the small bodies found in the liver cells which swell up with acetic acid have also been found here (Dienst[16]) ; they are probably some result of proto-plasmic degeneration. Œdema and infiltration of the fibrillæ occur also ; there is usually dilatation of the right side of the heart, and some hypertrophy of the left ventricle.

Lungs.—Infarcts at times, but they are not common , thrombi and fat emboli in the arterioles, sub-mucous and sub pleural petechiæ. At times ordinary pneumonic appearances, and Dienst[16] describes homogeneous masses in the peribronchial arteries which are coloured red with alum carmine, do not stain as amyloid material, and which give the appearance to the arteriole as if composed of three rings ; the outer being the muscular layer, the middle composed of the little masses described, and the inner of clotted blood. Liver cells and also placental cells are said to have been seen in the thrombi.

In the placenta are often seen yellowish or whitish patches, the same as occur in patients who have severe albuminuria or chronic renal disease. Infarcts have been described, of course, both here and in normal cases. Martin[42] has also described changes in eclamptic placentæ, but says one also finds them in non-eclamptic conditions.

Placental-cell emboli have been described in the circulation by Schmorl, Pels-Leusden, and Lubarsch ; these cells are said to be distinguished by their dark protoplasm, in the centre of which there is a heap of rounded nuclei. As Lubarsch found the same appearances in a case of Chorea Gravidarum with fits, he thought 'there might be some connection between fits from

any cause and the finding of these cells in the circulation. Later in this paper reference is made to their possible escape from the placental site. Griffith and Eden [34a] described changes in the chorionic epithelium and stroma, and in the decidua, of a 5 weeks' ovum, removed from a patient who was suffering from renal disease, and had had eclampsia at a previous confinement.

In the *Brain* the following have been described in the different cases examined. Œdema of the pia and the cortex-hydrops of the ventricles, hæmorrhages of the pia mater and of the substance of the brain in different parts, and thrombi of small vessels.

There are two cases at least recorded where there was infarction of one of the suprarenal glands. Petechiæ have been found in the mucous coat of the stomach. In one case at Queen Charlotte's Hospital where I examined the thyroid, the acini were dilated but otherwise normal—the gland was somewhat hypertrophied. The thyroid seems to have been very seldom examined in post-mortems on eclamptic cases.

The Pathological Changes in the Organs of the Child.

Schmorl [63] examined 6 cases where the mother had had eclampsia, and in 4 of these there was severe degeneration of the kidneys. Lubarsch [41] also found degeneration of the kidneys and of the liver, and thrombi in the vessels. Prutz,[55] and Gotschalk [26] also found the same kidney changes, the former in the case of a child removed by Cæsarean section. Schmid [62] noted blood extravasations in the liver and kidneys where there were fits like those of eclampsia in the child. Edinger [18] examined 5 children from eclamptic mothers; and Wilke [79] reports encephalitis in one case. Dührssen [17] mentions in 1 case where a child of an eclamptic mother died when 2 days old, that there was a clot on the surface of the brain at each side of the median line, but it seems to me very doubtful if this had anything to do with eclampsia, one so often finds clots on the surface of the brain in children who die soon after birth. I have found them at Queen Charlotte's in several cases where the labour has been comparatively easy—so much depends on the degree of ossification of the cranial bones. In two cases at Queen Charlotte's Hospital, where I examined the kidneys of children of eclamptic mothers, the whole kidney was very

deeply congested, the cortex not so deeply coloured as the pyramids—there was fatty and granular degeneration of the epithelium of the tubules, especially of the convoluted tubules: there was also an extraordinary amount of extravasated red blood cells. The glomeruli showed little change. It is interesting to note that the kidney of the child of a mother who had severe puerperal albuminuria and chronic nephritis, which I examined, showed exactly the same changes.

Thrombi has also been described and casts of all kinds in the tubules. Meyer-Wirz [44] describes a case where there were perivenous collections of white cells.

Necrotic areas have been found in the liver, and hæmorrhages on its surface, and petechiæ in the stomach and under the pericardium and pleura.

Kolman [36] and others found that the fibrin is increased in the blood of both the mother and the child.

Eskelin [19] found in 5 cases albumen in the urine of children of eclamptic parents; in 2 other cases described, while the amount in the mother's urine was ·7 per cent. and ·8 per cent., in that of the children it was ·02 per cent. and ·15 per cent.

Dienst [15] and others also found albumen and blood in the urine; still there are cases where, although the mother had eclampsia, the urine of the child did not show any change. Casts of various kinds are often present, and at times red blood-cells.

The above-described degeneration without inflammation in the parenchymatous organs of the body, according to many writers, presents a characteristic picture for the pathology of eclampsia; but there are some cases of poisoning which are mentioned later which give quite the same appearances.

Winckler [32] thought that the hæmorrhages were due to the traumatic effects of the fit, associated with pressure of the uterus against the liver, etc.; but the anatomical position of the hæmorrhages is against this; and ;in the following cases there were no fits, and yet hæmorrhages and thromboses were found post-mortem.

In one of these cases, mentioned by Meyer-Wirz,[44] and which he refers to as a condition which may be called " status eclampticus," there were no fits; there was only slight kidney change, but the liver showed the most extraordinary degene-

ration in the form of miliary necroses, especially under the capsule. The general appearance to the naked eye of the liver was that of miliary tuberculosis.

Schmorl (*Archiv f. Gyn.,* Bd. 65) mentions 3 cases; Bouffe de St. Blaise[9] 1 ; and Wendt[76] 1 ; so that there are at least 6 cases on record. If fits are the distinguishing feature of puerperal eclampsia, should the above be included? As mentioned before, cases showing extreme liver changes are closely allied to acute yellow atrophy ; but in the present state of our knowledge they come perhaps under the heading in that section of puerperal eclampsia where the chief changes are found in the liver. Perhaps the system is so overwhelmed by the poison that the brain does not respond by causing convulsions in the usual way.

It is interesting to note that Meyer-Wirz[44] gives one case of carbolic and another of sublimate poisoning after confinement, giving a condition of things resembling eclampsia.

The occurrence of thrombi is a very marked pathological appearance, and a great deal of interest centres round this point. Some of them are hyaline, and a certain time is required for this kind to form.

Schmorl,[68] Lubarsch,[41] and others have also described hyaline thrombi in the organs of the child. In one case described the child of an eclamptic case died a few hours after birth in a fit—said to have been an "eclamptic fit"—and another case where the child of an eclamptic mother died also soon after birth, and in each case hyaline thrombi were present; and they must have been there for some time without giving rise to any symptoms. Perhaps the death of the child was due to extension of the thrombi into some vital part.

The causation of the thrombi in eclampsia is discussed by Dienst[44] and others. It is certainly possible that damage to the walls of the vessels, as described in the pathological appearances—where at times some of the smaller arteries have been found with the walls considerably injured—may be one of the causes. Damage to the walls of the vessels in the brain was found by Schmorl[63] and Pfannensteil.[55] The appearance of the small round masses in the endothelium was thought (v. Winckel) to be due to a cramp of the vessel wall. Perhaps it may be a degeneration product, as the little masses described

by Dienst [15] seem to be ; then, again, the blood extravasated so freely in so many of the tissues shows either bursting of the smaller vessels—or at least injury to their walls ; and that this is not in all cases due to the fit is seen from the cases of eclampsia without fits quoted.

In many cases, in the mother and child, the veins and capillaries in the kidney are wider than normal, and in the mother the pressure in the abdomen will cause a varying amount of statis which may assist any other cause in the formation of thrombi.

Then one must remember that there has been found by Dienst [15] and Kolman [38] an increase of fibrin in the blood both of the mother and child ; the latter author also thinks excess of globulin in the blood has to do with the causation of eclampsia, and perhaps also it may assist in the formation of thrombi.

Schmorl [68] thought that cells from the placenta might be the cause of this increase of fibrin ; later this was contradicted, but still more recent work appears to indicate the possibility of the placenta either being the origin of some toxin, or that the placental cells themselves may get into the circulation of the mother and give rise to some substance which will increase the amount of fibrin. Looking through the literature it will be seen, however, that some writers have described placental cells and others liver cells in thrombi. Is it not quite possible that they all are describing the same cells ?—wherever they originate.

Wooldridge [88] and many others since his time have found that extracts of parenchymatous organs when injected into the circulation of animals cause thromboses and infarcts and degeneration of parenchymatous cells—rather similar to what is found in eclampsia, and it is quite possible that some albuminoid substance may cause the increase of fibrin directly, or, what is more probable, indirectly, through the increased formation and destruction of leucocytes, and also cause the degeneration of parenchyma, directly, or indirectly, through damage to the vessel walls and the formation of thrombi. It is quite possible that in post-partem eclampsia, one cause may be the extension of preëxisting thrombi in spite of the fact that local paralyses are not noted.

Before going further into the possibilities of the nature of

this poison, it will be better to discuss the work which has been done in the chemistry of the urine and blood.

The Chemistry of the Urine.—In practically all cases there is albuminuria, and usually a large amount, as was first pointed out by Lever [39] in 1843 and by Deuchars and Regnault [14] in 1848 ; the more recent work shows that this albumen is due to degeneration of the kidney, and it usually contains a large proportion of globulin. Both the albumen in puerperal albuminuria and in eclampsia increases up to the time of delivery, and very rapidly diminishes and disappears afterwards, thus differing from the true renal nephritis cases, where the albumen remains, but to a less extent after the lying-in period. It is extraordinary how quickly the albumen, which perhaps made the urine almost solid on boiling before delivery, will quite clear up in a few days. Then the blood in the urine, without the evidence of microscopical work, would suggest an inflammation, but it is now known that the infarcts thrombi and extravasation of blood ·in the kidney are quite sufficient to account for it.

The urea is always noted to be very low both in puerperal albuminuria and eclampsia, especially in the latter ; this occurs, too, in ordinary nephritis and in diseases of the liver apart from pregnancy.

There is a great increase in the amount of urea in the first few days after delivery, and this surely must be either due to storing up of urea or its precursors in the system, or to an enormously increased metabolism. I have often noted that in estimating urea in the usual way the amount passed after, say, the second or third day, is truly enormous. Recent work, as quoted below, appears to show there is no retention of urea or ammonia in the blood, and it is not at all probable that the proteid metabolism is so increased that as much as 40 or over 50 grammes of urea are produced in a woman lying quietly in bed on milk diet. So we must assume that there must be an accumulation in the system of unoxidised precursors of urea—half-way products between proteid and urea—which after delivery are oxidised and leave the body as urea.

In the following cases the estimation of urea was done by the usual hypobromite process, and probably represents also small quantities of ammonia, etc. It was estimated from

24-hour specimens sent down to the Pathological Laboratory in Queen Charlotte's Hospital in the last two years :—

Eclampsia.		Grammes Urea in 24 hours.	Eclampsia.		Grammes Urea in 24 hours.
B. 4th day	- -	15·1	F. 3rd day	- -	17·9
6th ,,	- -	41·2	4th ,,	- -	42·6
Eclampsia.			5th ,,	- -	23·4
I. 2nd day	- -	11·60	——	- -	25·1
3rd ,,	- -	6·76	——	- -	19·2
4th ,,	- -	15·20	——	- -	20·8
5th ,,	- -	26·10			
6th ,,	- -	30·20	**Eclampsia,**		
7th ,,	- -	23·0	D. 3rd day	- -	44·3
8th ,,	- -	22·9	4th day	- -	23·0
Chronic Renal Disease and Eclampsia.			5th ,,	- -	50·8
D. 3rd day	- -	10·9	6th ,,	- -	19·4
4th ,,	- -	35·04			
5th ,,	- -	33·60	**Eclampsia.**		
6th ,,	- -	37·10	F. 1st day	- -	26·2
Eclampsia.			2nd ,,	- -	13·4
H. 3rd day	- -	32·4	3rd ,,	- -	33·0
——	- -	26·8	4th ,,	- -	59·4
7th day	- -	45·4	5th ,,	- -	56·1
8th ,,	- -	26·6	6th ,,	- -	43·1
9th ,,	- -	27·2	8th ,,	- -	17·0
10th ,,	- -	39·0	9th ,,	- -	21·7
Eclampsia and Chronic Renal Disease.			10th ,,	- -	27·0
J. 3rd day	- -	44·3	11th ,,	- -	19·7
4th ,,	- -	23·0	12th ,,	- -	22·9
5th ,,	- -	30·0	13th ,,	- -	18·9
6th ,,	- -	19·4			

If one takes 20—25 grammes urea as about the normal amount passed by a woman on light diet in bed, the amount of urea passed a few days after confinement in these cases is truly enormous, especially as in many cases part of the quantity was lost, having been passed with the stools. It certainly looks like a retention of urea, or its immediate precursors, in the system ; but perhaps the breaking down of the partially oxidised metabolic products may account for it, assisted by the involution change in the uterus. Normally, about 83 per cent. of the nitrogen in the urine is in the form of urea. Zweifel[87] shows that in eclampsia the relation of the urea to the total N. is upset, and the more albumen in the urine indicating embarrassment of the kidney, and the more toxic the substances in the

system, the *less* the relative amount of the urea to the total N. of the urine.*

Ammonia in the Urine.—In normal acid urine the ammonia with the K, Na, Ca, and Mg, is in combination with hydrochloric, phosphoric, sulphuric, uric, hippuric, etc. acids ; with sulphuric and hydrochloric as neutral salts, as they are stronger acids than the others.

Zangemeister, in Neumeister's " Lehrbuch," [49] considers there is an increase of the ammonia in the urine, and Neumeister suggests that there is an excess of acid in the blood accounting for this ; as it has been found experimentally that when animals are given an excess of mineral acids the ammonia in the urine is increased, until actually the urea is displaced by ammonia ; the system appears to react to the acid poisoning by forming an excess of ammonia from its nitrogenous metabolism instead of forming urea, and thus protecting the system from an excess of acid; also with acid poisoning an animal gets a low temperature, dyspnœa, somnolence, and collapse (Neumeister,[49] p. 648). Conversely, fixed alkali, if given to an animal in excess, can be made to displace the ammonia in the urine in favour of urea.

Zweifel [87] mentions a case where the urine was alkaline during the fit, and refers to other cases where in eclampsia the urine was alkaline, and although his numbers and experiments do not show any marked variation from the normal in the amount of ammonia in the urine, he seems to agree with Zangemeister as to the possibility of an acid poisoning being the cause of the disease.

Again, Whitney and Clapp [77a] conclude that there is, in normal pregnancy and in eclampsia, a diminution in the amount of urea passed, and an increase in the nitrogen in the form of ammonia and the antecedents of urea.

The Sulphur in the urine is usually divided into the ordinary sulphates—the ethereal sulphates and the neutral or non-oxidised sulphur. In normal urine the proportion of ordinary sulphate plus ethereal sulphate—or generally the "oxidised sulphur" to the neutral or "non-oxidised sulphur"—is about 84 per cent. to 16 per cent. It is also found that the relation of the total N. to the sulphate (reckoned as H_2SO_4) is 100 to 20.

* The N. in the albumin is not considered.

Zweifel[87] found, after very careful work, that the more severe the case of eclampsia the larger was the proportion of neutral S. and the smaller the proportion of sulphate, and also that the relation of the total N. to the sulphate was greater than normal. He also found that in puerperal albuminuria the neutral S. is high, and it increases till birth, and in a case of uræmia the neutral S. was as much as 37·3 per cent., or more than double the normal, so the above work throws a new light too on uræmia.

So in eclampsia, puerperal albuminuria (and apparently also in uræmia) the "oxidised sulphur" and the urea diminish while the patient gets worse and increase as convalescence commences : certainly the most probable explanation of this is deficient oxygenation in the tissues.

Massen wrote about leucomaines in the urine, but it is difficult to know what is meant by this term, which seems to be employed for different substances by different writers ; at present very little is known about the importance of the remaining nitrogenous bodies of the urine in both uræmia and eclampsia.

Araki,[4] Zillensen,[86] and Irisawa,[32] in Hoppe-Seyler's Laboratory, found *lactic acid* in the urine of animals when they were deprived of sufficient oxygen. Zweifel[87] found *lactic acid* in the urine in eclampsia, but it has been found also after severe muscular exertion by Spero, Colasanti, Muscatelli, and others, after an epileptic fit by Araki, and it is known to occur after the drinking of sour milk, and has been mentioned as occurring also in cases of puerperal albuminuria ; and lactic acid is known to have the power of dissolving red cells and causing hæmoglobinuria.

Is the Urine in Eclampsia toxic ?—Very varying and contradictory results have been obtained. Bouchard[8] considered that it was more toxic in eclampsia than in normal pregnancy, and more in normal pregnancy than in the non-pregnant condition. Rosenberg found that the substances taken out of eclamptic urine by means of alcohol and ether were not poisonous, but that an aqueous solution was—so considered the toxine was insoluble in alcohol and ether, and thought that the potassium salts were connected with the toxic action.

Hahn, Massen, Nencki, and Pawlow,[37] in Russia, thought,

K K

from their experiments by diverting the blood from going through the liver by means of Eck's fulula, that the poison in the blood was *carbamic acid ;* later, Hahn (*Cent. f. Gyn.* quoted Massen) did not find any excess of this body in the urine.

Massen,[48] later, considered there was an auto-intoxication due to deficient oxidisation, and the so-called "leucomaines," which were in excess in the urine, were the cause of this. Other observers, as Poehl, also wrote about leucomaines ; this writer mentions that he finds more leucomaines in pregnancy than in non-pregnant conditions.

The most carefully conducted recent work has been done by Volhardt[73] and Schumacher.[66] Their results are in total opposition to their predecessors ; the latter made careful preliminary controlling experiments, with saline injected alone into animals, and found that when the strength of the solution was increased, it was alone sufficient to act as a poison. After this he tried the result of urine injections ; in one case mentioned, where the S.G. was 1020, it was toxic, but when diluted to 1010, was not toxic, and his work shows that it is worse than useless to talk about "toxicity" without proper control experiments. Schumacher did not find any difference, whether the urine came from a case of normal pregnancy or from one of puerperal albuminuria or of eclampsia. Both the above-mentioned writers agree that the so-called toxicity of the urine depends on its concentration and specific gravity, and Schumacher says the result on the animal varies according to the age, size, and race.

Van der Bergh[71] also confirms the above conclusions. So, with regard to the urine, in addition to what is known about the urea and albumin, one must conclude that there is not much alteration in the *ammonia ;* that *lactic acid* is, at times at least, present ; that there is a tendency in many cases for the urine to be alkaline ; that we know very little about the other nitrogenous bodies; and that the urine is not more toxic in eclampsia. Dienst's work on the sulphates shows that there is deficient oxidisation occurring in the body.

Again, there is no known essential difference between the condition of the urine in eclampsia and in puerperal albuminuria.

The Blood in Eclampsia.—Butte, 1894 (quoted Zweifel[87]),

extracted the blood of eclamptics with alcohol, evaporated the solution, and took up the residue with water and decomposed with hypobromite, and thought that in favourable cases of eclampsia there was *more* urea in the blood, and explained this by assuming that as the liver function gets more disturbed, less urea is formed. It is quite possible this conclusion may be correct, but in this way of estimating, the ammonia and amido bodies are counted in with the urea, as they are decomposed by the hypobromite also.

Zweifel,[87] 1904, with careful and exact work, could not find any evidence of accumulation of urea in the blood of eclamptics.

Spiegelberg, Gschleiden, and others considered there was an excess of ammonia in the blood, and the former said that by injecting ammonia salts into animals, that the same clinical picture as eclampsia was given. Massen's experiments with Eck's fistula have already been referred to ; and if carbamic acid and its salts are formed in this way, they are also presumably formed when the liver is not acting normally and there is deficient oxidisation in the body as the result. Then it is probable that carbamates pass very rapidly into ammonia, and perhaps ammonia may collect in the blood ; but Zweifel's experiments (1904) are against this theory, as he was unable to find any excess of ammonia in the blood or tissues ; and, as has been already seen, not much change in the ammonia of the urine. With experiments giving these results, I do not see much ground for the theory that the cause of eclampsia is an acid, at least with any simple acid causing an excessive protective formation of ammonia ; but the matter is certainly worth further experiment, and we must remember that working with any substances which normally are only present in minute quantities, it is very difficult to say whether they are increased or diminished.

Zweifel found that in two normal cases of pregnancy the amount of ammonia in 100 c.c. of the blood was ·007 per cent. and ·00644 per cent., and in a case of eclampsia brought into the Klinik in an unconscious state there was much less than this amount. Zangemeister[85] has noted a diminished alkalescence of the blood in eclampsia, and that this was more striking in the fatal cases. From the experiments by Zangemeister

and Zweifel on the urine, one might expect that there would be some retention of ammoniacal compounds in the blood and tissues if there is any acid poisoning, as has been suggested. If we accept that in uræmia there is an increase in the blood of ammoniacal compounds and urea, the above work points out another distinction between this disease and eclampsia.

Zweifel did not find either B. oxybutyric acid nor oxalic acid and its salts, nor an excess of CO_2 to be present in eclamptic blood.

Wiessner [73] and Vaquez and Nobécourt,[74] 1901, and others investigated the blood pressure. It has been found to rise up to the time of the fit, when there was a sort of cramp of the vessels, and to fall afterwards.

Schroeder [64] investigated many cases to find if one could foretell a fit by variation in the blood pressure, but was not successful. Kroenig [86] found that contractions of the uterus and the fits caused the blood pressure to rise enormously, even 280 mm. mercury has been noted by him.

Schmid (quoted Kolman) found a relatively greater amount of globulin in the blood ; also Pestalozza,[64] perhaps, through the breaking up of white cells, which are known to be in excess.

Kolman [38] and Dienst [15] find that the amount of fibrin in the blood is increased. In 1897 the former refers to the probability of the products of fœtal metabolism as the cause of this. As, however, an excess of leucocytes exists, the breaking down of these may cause the increase of fibrin ; but the products of fœtal metabolism may be the cause of the excess of leucocytes. The leucocytes were found to be in excess by Alalykin,[2] Lubarsch,[41] Dienst,[15] and others.

As has been mentioned, placenta cells have been described in the blood of the mother. Weichardt,[75] working in Schmorl's Laboratory, injected animals with human placenta cells broken up in NaCl, and the serum from the animals so treated had the power of dissolving placental cells ; and secondly, by treating rabbits with human blood, got a hæmolytic serum in which he næmolysed placental blood, and then injected into three other rabbits, and one of them died at once with clotting of the blood but no convulsions. With similar hæmolytic serum and human placental cells, he injected *pregnant* animals. *Convulsion and*

death resulted, and the post-mortem condition resembled that found in eclampsia.

Ascoli,[5] 1902, describes a heterolysin and an isolysin in two kinds of serum : the former obtained by treating rabbits with the placenta of a guinea-pig, and the other (isolysin) by treating rabbits with rabbits' placenta. Heterolysin is only active when injected subdurally into guinea-pigs ; it is better when heated to 60°, while isolysin is inactive.

I give these results to show the lines along which inquiry has proceeded recently, although nothing definite has so far resulted ; then, again, one must remember that so mãny cellular organs in the body will act as poisons, causing destruction of red blood cells and thromboses.

However, there may possibly be some sort of *syncytiolysin* normally occasioned in the blood by the placenta; and it may cause immunity in subsequent confinements, whether there be eclampsia at the first confinement or not.

In 1902 Poten found placental elements in the blood in cases of pregnancy, examined while the placenta was still in relation to the wall of uterus, and microscopically there appeared to be in these cases a leakage of chorionic elements into the blood of the mother. One would expect more leakage in the case of twins : and then some theory of this sort might fit the post-partum cases of eclampsia, as it is probable that when the placenta is separating, more elements would get into the blood.

The recent work of Politi[57] is also interesting ; he made extracts of placenta in 1 per cent. Na_2CO_3, filtered and sterilised, and injected into rabbits ; he found that extracts made from normal placenta are least toxic, from placenta of patient with puerperal albuminuria more so ; and the most toxic extracts were obtained from eclamptic placentæ.

Bouffe de St. Blaise[9] thought that the blood of a normal fœtus was less toxic than an eclamptic one ; and Chambrelent[13] found in one case that the blood of the fœtus was more toxic than that of the mother.

Bell,[6] in his case, which closely resembles acute yellow atrophy, found that the blood was toxic, and mentions that the blood from two cases of uræmia in hospital at the same time gave a negative result as to toxicity.

However, Volhardt and Schumacher, in their work mentioned under toxicity of the urine, found that the serum of the foetus is not more poisonous than the serum of the mother, whether healthy or albuminuric; and mention that serum injections are always very dangerous to animals. All recent works confirms this, and it is exceedingly difficult to say whether a serum contains any definite poison, as the serum of one animal is poisonous to another.

Schumacher also found that there was no difference between the serum in normal pregnancy, puerperal albuminuria, and eclampsia; and the serum of the foetus did not differ from that of the mother.

With these more exact experiments in the light of modern Physiology, one cannot accept the work of Tarnier, Chambrelent, Bouchard, Ludwig and Savor, and others, and must conclude that so far nothing has been proved with regard to the toxicity of the blood serum in eclampsia.

Many cases have been described as *eclampsia without albuminuria*. Schmorl[68] mentions a case when the only post-mortem change in the kidney was vascular stasis, and, microscopically, a fine granular precipitate in the capsules and in the canals; but he found that the heart muscle was very flabby, the cells cloudy, necrotic, and degenerated; and in this case there had probably been a heart insufficiency for years, and a little extra strain has overtaxed the circulating and excretory organs so as to render them incompetent to get rid of the products of metabolism.

One wonders whether all the cases described as eclampsia without albuminuria were really true eclampsia, and also whether albumen was carefully looked for. Is it not probable that some cases of epilepsy are included? Zweifel[87] mentions a case where the fit, nine days after delivery, may have very well been epilepsy. Here, however, there was albuminuria. In a second case there was also a doubt. He mentions also a third doubtful case of eclampsia; and a fourth, where there was no albumen, or diminution of urea, but the urine contained a large relative quantity of " neutral " sulphur.

(*To be continued.*)

THE CYTODIAGNOSIS OF PLEURAL AND CEREBRO-SPINAL FLUIDS.[1]

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INTRODUCTION.

THERE are several laboratory methods available for the study of the various pathological effusions formed in the body, but the information furnished by many of these is unfortunately of limited value in diagnosis. Naked eye inspection shows the colour, transparency, turbidity, or chylous appearance of the liquid. The specific gravity is likewise easily determined. The spontaneous formation of a clot denotes the presence of fibrinogen and fibrin ferment. Chemical tests may show albumen, complex sugar-reducing and other substances, and the more recently applied cryoscopic experiments, the molecular concentration by determination of the freezing point.

The clinical data thus obtained have only limited diagnostic value, and the same remark applies to bacteriological examinations. The latter, in the event of the discovery of pneumococci, tubercle or typhoid bacilli and other organisms, give most valuable etiological clues, but many of the effusions we are dealing with are sterile, more particularly those of tubercular origin. In addition, bacteriological examinations, to be conclusive, must comprise the growth of cultures and inoculation experiments, which are too lengthy, and require technical knowledge and facilities not usually possessed by the general practitioner.

It is with the object of providing some method which shall be at once simply and easily carried out, require no expensive apparatus, and at the same time give valuable aid in diagnosis that of late much attention has been devoted to the careful study of the cells present in various pathological effusions.

Lewkowicz[2] has claimed priority in the application of cytodiagnosis for certain Polish observers, Winiarski[3] and Korczyriski and Wernicki,[4] who stated that serous effusions

[1] A paper read before the Hull Medical Society.
[2] Lewkowicz : "Le Cytodiagnostic," *Presse Médicale,* August, 1901.
[3] Winiarski : *Kronika lekarska,* 1896.
[4] Korczyriski and Wernicki : *Przeglad lekarski,* 1891.

which do not become purulent contain lymphocytes, but if polymorphonuclear cells are found, either formation of pus is imminent or cancer is present.

It is to Widal and Ravant,[1] however, that the credit is due of having first shown the importance of a careful histological examination of the cell contents of pathological effusions, and since the publication of their first paper in June 1900, numerous observers, chiefly in France and Germany, have added to our knowledge of the subject. As the result of their investigations, Widal and Ravant stated their so-called cytological formulæ, which they regard as applying to the cells found in the different effusions they examined.

As my time is limited, I shall confine my remarks to pleural and cerebro-spinal fluids of which I have had experience, though interesting results have also been obtained from the examination of peritoneal, pericardial, arthritic, and hydrocele fluids.

METHOD OF PERFORMING CYTOLOGICAL EXAMINATIONS.

Firstly, with regard to the way in which the fluids for examination are procured, it is unnecessary to say more than that *pleural fluid* is obtained as usual in exploring or tapping the chest. I generally use an ordinary antitoxin syringe of 10 cc. capacity with hollow needle for obtaining both pleural and cerebro-spinal fluids. In performing *lumbar puncture* I use the method which we owe to Quincke, and puncture between the third and fourth lumbar vertebræ, about one centimetre from the middle line, pushing the needle slightly upwards and inwards to a depth varying with the age, muscular development, &c. of the patient. I never use aspiration in lumbar puncture, making use of the syringe merely as a convenient handle for introducing the needle. The fluid will usually flow from the needle drop by drop, the rate varying with the pressure there is present at the time. The patient may be in the sitting position, but in my opinion is better in bed lying on his side. For diagnostic purposes I do not withdraw more than 5 cc. of fluid in a child or 10 cc. in an adult. Any troublesome after-effects are rare, though headache, nausea, vomiting, and convulsions have been

[1] Widal et Ravant: "Applications cliniques de l'étude histologique des épanchements séro-fibrineux de la plèvre," *Société de Biologie,* June 30, 1900 Ravant: "Le diagnostic de la nature des épanchements séro-fibrineux de la plèvre," *Thèse de Paris,* 1901,

noticed. Recently pressure symptoms produced by a blood-clot in the spinal canal have been recorded, and Gumprecht[1] notes a case of sudden death after lumbar puncture, but in a patient with cerebral tumour where large quantities of fluid had been withdrawn. Ossipow[2] collected 12 fatal cases of lumbar puncture.

Having obtained the fluid, it is next necessary to collect the cells for examination. This is best done by centrifugalizing the fluid immediately it is obtained; two or three minutes being usually sufficient to deposit all the cells to the bottom of the tube. If the centrifugalizing is not done at once, it is necessary in the case of many effusions to defibriate them, as they contain the elements necessary for the formation of fibrin. Defibrination is speedily effected by shaking the fluid in a bottle containing a number of small glass beads. Minute detached clots are thus formed, and on centrifugalizing fall to the bottom of the tube with the cells and other solid particles. If some time has elapsed and a clot has already formed, it is still possible to carry out a cytological examination, as by shaking with glass beads the coagulum is broken up and the entangled cells get free; the fluid is then centrifugalized as before.

From the deposit obtained by centrifugalizing we have to make our films in order to examine the cells. I use two methods. The first is an ordinary wet preparation, stained by methylene blue run under the cover glass. The second is by dry films. The deposit is evenly spread out by means of a pipette on a glass slide, it is then dried in the air and fixed by heat just like an ordinary blood film. Another film may be fixed in a mixture of equal parts of ether and alcohol. I prefer to use slides rather than cover glasses, as the former are more readily handled, not so easily broken, and give larger fields for search. Sometimes the fluid is so highly albuminous that the whole film stains very deeply and details of the cells are obscured; to obviate this defect, I mix the deposit with saline solution, shake up, and again centrifugalize, thus washing away everything but the cells, which then stain clearly on the slide.

The stains I usually employ are methylene blue and eosin,

[1] Gumprecht: *Deutsche medicinische Wochenschrift*, June 14, 1900.

[2] Ossipow: *Deutsche Zeitschrift für Nervenheilkunde*, April, 1901.

logwood and eosin, Ehrlich's triacid or Romanowski's (Leish-
man's) stain. It is well to try more than one method of
staining, as the cells in effusions are often degenerated and stain
badly, this being especially the case with neutrophil granules
stained by Ehrlich's triacid stain.

The counting of the cells is carried out as in an ordinary
stained blood film. Laignel-Lavastine[1] has described a method
of counting the exact number of cells per cubic mm. in
cerebro-spinal fluid, but we can estimate the number approxi-
mately from the turbidity and the volume of the clot on
centrifugalizing ; moreover, it is the relative proportion of
the different cells and not their actual number which is of
importance.

THE VARIETIES OF CELLS FOUND IN PATHOLOGICAL EFFUSIONS.

The most important cells occurring in pleural and cerebro-
spinal fluids from the cytological point of view are the
polymorphonuclear leucocytes ; the mononuclear cells, chiefly
small lymphocytes ; endothelial and cancer cells.

Polymorphonuclear cells when not degenerated are usually
easily recognised, but in many effusions some of the cells
undergo fatty, glycogenic and other changes which make them
very difficult to stain and identify. Swelling of the nucleus
with loss of its lobulated appearance and distinctive staining
properties reproduce the characters of large mononuclear cells.
Splitting of the nucleus with detachment of portions of the
cell protoplasm produces bodies described by Ehrlich under
the unfortunate term of " pseudo-lymphocytes," and found by
Wolff[2] and others in pleural effusions. These degenerated
forms are generally found associated with undoubted polymor-
phonuclear cells, and are especially abundant in effusions which
are becoming purulent in character. If neutrophil granules are
stained there is little difficulty in spotting these forms, but very
frequently this is not the case. Earl[3] gives some useful rules
for the identification of degenerated polymorphonuclear cells.

With regard to *lymphocytes*, these are generally easily

[1] Laignel-Lavastine: *Société de Biologie*, May 24, 1901.
[2] A. Wolff: "Morphologie der Pleuralgüsse," *Berliner klinische Wochenschrift*,
1901 and 1902.
[3] Earl: *Dublin Journal of Medical Sciences*, December, 1903.

recognised as small round cells slightly larger than a red blood corpuscle, with deeply staining, rounded nucleus, surrounded by a narrow ring of protoplasm, staining lightly basic or neutral.

Without entering into the controversy as to the origin of lymphocytes, I may say that there is some difference of opinion regarding the cells usually called lymphocytes found in pathological effusions. Some observers consider them to be degeneration products of endothelial cells. Thus Tarchetti and Rossi[1] found that the endothelial cells present in transudates were associated with small mononuclear cells in large numbers ; these latter, they say, are different from true lymphocytes, and are modified endothelial cells. The lymphocytes found in primary pleurisy of tubercular origin are, these authors believe, true lymphocytes, and not regressive phases of changes in endothelial cells. Patella[2] states that the lymphocytes are really the free nuclei of endothelial cells, and that he has watched the progress of the changes in these cells up to the time at which the free nuclei are found. He believes that pseudo-lymphocytes may be found in any condition in which endothelial cells are cast off in large numbers.

It is probably owing to failure in recognising some of these degenerate forms that some of these discordant results obtained in cytology may be accounted for.

Endothelial cells are usually found either singly or in groups. When single they appear as large, somewhat rounded, cells with clear-staining nuclei, but when in groups the outline of individual cells is often indistinct. When degenerated, certain forms appear very like the large mononuclear cells of blood.

Erythocytes are often found in pathological effusions ; their presence is frequently accidental and due to the wounding of some small vessel. Although formerly great importance was attached to their presence from the cytological standpoint, they are now regarded as of no special significance.

Eosinophils sometimes occur, and Widal has recorded a case in which they amounted to 20 per cent., but although Klein says that they are the result of active hæmorrhage or

[1] Tarchetti and Rossi: *Gazzetta degli Ospedali*, No. 102, 1902.

[2] Patella: "Ueber Cytodiagnostie der Ex- und Transudate," *Deutsche med. Wochenschrift*, Vol. XXVIII., No. 16, 1902.

extravasation of blood, I do not know what conclusions to draw from their presence.

Cancer cells I shall refer to later.

THE CYTOLOGY OF PLEURAL EFFUSIONS.

It was on the results obtained from many cytological examinations of pleural effusions that Widal and Ravant based their cytological formulæ, which they contend are constant in the several kinds of effusion to which they are applied. From a knowledge of the relative proportion of the different varieties of cells found, the nature and etiology of the morbid process may be concluded.

I shall first consider *primary tubercular pleurisies*, in which there is no clinical evidence of deposits in the lung.

There is no doubt that many pleurisies which were at one time called rheumatic, and attributed to "taking cold," etc., showed in the course of time their undoubted tubercular nature. It is in such cases that great difficulty is frequently experienced in forming a correct diagnosis, and a method which would permit of our saying from the result of a brief examination of the fluid whether any effusion was of tubercular origin or not, would be of the greatest service. From my own experience and that of others I think we are now able to do this with a great degree of probability.

In such primary tubercular cases, confirmed by inoculation, tuberculin injection, or autopsy, Widal and Ravant found *lymphocytosis* almost exclusively. Polymorphonuclears, if present, are generally less than 10 per cent. Sometimes there are a few erythocytes and occasionally large mononuclear and endothelial cells.

Very numerous observations by Barjon and Cade,[1] Labbé, Dieulafoy,[2] and others, in France ; by Litten and Wolff,[3] in Germany ; and Gulland,[4] in this country, confirmed these views. At the last annual meeting of the British Medical Association, Professor W. Osler and Dr. James Barr,[5] of Liverpool, admitted

[1] Barjon et Cade : " Cytologie des épanch. des les séreuses," *Archives médicales des Hôpit. de Lyon*, March, 1902, and *Archives générales de Médécine*, August 1903.

[2] Dieulafoy : " Clinique médicale de l'Hôtel-Dieu," *Première leçon*, 1901–2.

[3] Litten and Wolff : *Zeitschrift für prakt. Aerzte*, No. 18, 1901 ; *Zeitschrift für klin. Med.*, 1901 ; *Fortschritte der Medicin*, April, 1902.

[4] Gulland : *Scottish Medical and Surgical Journal*, June, 1902.

[5] Oster, W., and Barr, J. : *British Medical Journal*, October 15, 1904.

the considerable assistance afforded by an examination of the cellular elements in pleural fluid, which cells in tubercular cases are nearly all lymphocyte.

My own experience of a large number of cytological counts in this condition has proved that in almost all cases which turned out to be tuberculous there was a marked excess of lymphocytes throughout the greater part of the disease.

It has, however, been rightly pointed out that during the earlier stages of the affection the cytological count is not always so simple as this. There is often, during the first few days, a fairly high percentage of polynuclear cells, varying in number with the acuteness of the process. There may also be endothelial cells present in large numbers, as shown by Widal. In these cases, however, after a short time the usual lymphocytosis generally appears.

Barjon and Cade[1] report a case in which the fluid, three days after the onset of the attack, contained 68 per cent. of polynuclear cells and 30 per cent. of lymphocytes; six days later the fluid contained only 6 per cent. of polynuclears, whilst the lymphocytes had risen to 80 per cent. A similar case has come under my own observation.

In another case reported by the same observers there were at first 60 per cent. of endothelial cells, but after a week these were wholly replaced by lymphocytes.

These facts show the importance of making a second observation in about a week after the first cytological count in these cases.

In *secondary tubercular pleurisies,* as those secondary to phthisis, or in hydropneumothorax developing in tuberculous lungs, the cytological count generally shows a preponderance of lymphocytes, but there may be a very mixed cell formula, as we should naturally expect from the fact that other organisms than Koch's bacillus are introduced. There are generally besides lymphocytes, polynuclears both normal and in various stages of degeneration. In these secondary cases, however, there are other clinical data to guide us, so that cytodiagnosis is not so much needed.

Of *inflammatory or acute infectious pleurisies,* those due to

[1] Barjon and Cade: "Cytologie des épanchements dans les séreuses," *Archives médicales des Hôpitaux de Lyon,* March 7, 1902.

pneumococci, streptococci, or other pyogenic organisms, are characterised by a marked predominance of polynuclear cells, though in early stages there may be many endothelial cells present. As the effusion becomes purulent, vast numbers of more or less degenerated polynuclear cells are found.

Pleurisies arising in the course of *typhoid fever* are, like the above, marked by polymorphonucleosis, though the percentage of these cells is not so high. Erythrocytes and endothelial cells are relatively more frequent.

In *mechanical effusions or transudations,* coming on in the course of renal or cardiac disease, there is generally found a majority of endothelial cells, either singly or in flakes; accompanying these are some lymphocytes and polymorphonuclear cells. In later stages these mechanical effusions may be found devoid of any cellular elements. In one cardiac case, in which I examined the effusion, though it was difficult to count the number of individual endothelial cells, they outnumbered the others by about 8 to 1.

In many *cancerous pleurisies* cancer cells are not found, but in others they are present, and if identified seem to clinch the diagnosis. The recognition of the cells of the different neoplasms is often very difficult, some resembling so closely small or large lymphocytes, and others endothelial cells. Warthin[1] was able to diagnose sarcoma of the pleura by means of spindle-cells found in the fluid obtained by aspiration. It is not infrequent to find cells in active mitosis in effusions, and the discovery of numerous cell-division forms is strongly in favour of a neoplasm, as mitoses are rarely found in the cells of purely inflammatory exudates. Labbé[2] and others have described very large round or oval cells with large nuclei and granular protoplasm with some vacuolation, which they regard as distinctive of sarcomatous effusions. Recently I saw a girl, aged 23 years, with anomalous signs of consolidation and fluid on the right side of the chest. Some of the fluid was withdrawn, and the sediment showed large sarcoma cells with mitotic nuclei. The diagnosis was confirmed later on autopsy.

[1] Warthin: *Medical News,* October 16, 1897.
[2] Marcel Labbé: *Le Cytodiagnostic,* Paris, 1903.

THE CYTOLOGY OF CEREBRO-SPINAL FLUID IN MENINGITIS.

Next to pleural effusions, the cytological examination of cerebro-spinal fluid has yielded the most useful results. According to Sicard, Mott,[1] Labbé, and others, the cerebro-spinal fluid under normal conditions contains no cellular elements, though Earl says that, if it be examined with great care, some few lymphocytes are normally found.

As long ago as 1896 Wentworth,[2] and in 1897 Bernheim and Moser[3] noted that in *tubercular meningitis* the cerebro-spinal fluid contained lymphocytes in great abundance, and very few polymorphonuclear cells.

Widal, Sicard, and Ravant,[4] Abadie,[5] and numerous other observers have since pointed out that in tubercular meningitis cells are always present in the cerebro-spinal meningitis in more or less great numbers, and that the majority, and sometimes almost the whole, of these are lymphocytes.

In *acute non-tubercular meningitis*, due to the meningococcus of Weichselbaum, the pneumococcus or streptococcus, or, in posterior basic meningitis, the majority of cells are polymorphonuclears. These observations are confirmed by many other observers.

Bendix[6] reports 8 cases of meningitis, 5 of them tubercular, and 3 sporadic cases of cerebro-spinal meningitis. Diagnosis was confirmed in all by autopsy. In the 5 tubercular cases the cells were almost entirely lymphocytes. In 2 of the cases of meningococcus meningitis, he found polynuclear cells, and in one a majority of lymphocytes; this was, however, in a chronic case which ran a very long course. Hand[7] has found polymorphonuclear leucocytes in excess of other forms wherever tubercle bacilli were not found. Zambelli[8] insists that a

[1] Mott: "Cerebro-spinal Fluid in relation to Disease of the Nervous System," *British Medical Journal*, December 10, 1904.

[2] Wentworth: *Archives of Pediatrics*, p. 567, 1896.

[3] Bernheim and Moser: *Berliner klinische Wochenschrift*, p. 468, 1897.

[4] Widal, Sicard, and Ravant: "Cytodiagnostic de la méningite tuberculose," *Presse Médicale*, October 17, 1900.

[5] Abadie: "Résultats de l'examen cytologique de quelques liquides céphalorachidiens," *Société de Biologie*, 1902, p. 946.

[6] Bendix: *Deutsche med. Wochenschrift*, October 24, 1901.

[7] Hand: *Philadelphia Medical Journal*, August 30, 1903.

[8] G. Zambelli: *Il Morgagni*, September, 1904.

differential diagnosis cannot be based on a leucocyte count alone. In 11 cases of tubercular meningitis he found lymphocytosis, but was unable to find Koch's bacillus. In the cases due to Fränkel's diplococcus, the leucocytes included forty per cent. of polynuclear cells. In cerebral tubercle there was always lymphocytosis present.

As regards my own experience, in 3 cases of tubercular meningitis confirmed by autopsy, I found an excess of lymphocytosis averaging over 70 per cent. In two cases of posterior basic meningitis there was an excess of polymorphonuclear cells in the cerebro-spinal fluid.

Though this is the usual cytological condition, yet there are very many conflicting and contradictory cases reported. Widal records a number of cases of tubercular meningitis, in which as high a proportion as 38 or even 45 per cent. of polynuclear cells were found. It has been shown that in cases of tubercular meningitis the preponderance of lymphocytes may be replaced late in the disease by polynuclears. Bernard found, in one tubercular case, 140 lymphocytes and 30 polynuclear cells; four days afterwards there were 36 lymphocytes and 157 polynuclears. The increase in the polynuclears coincided with a secondary infection with pyrogenic organisms. This may be the explanation of many of these cases.

Marcon-Mutzner[1] relates the history of a patient who died with symptoms of basic meningitis whose cerebro-spinal fluid contained polynuclear leucocytes exclusively, but at the autopsy the condition was found to be tubercular. In another case excess of lymphocytes was found in the cerebro-spinal fluid from a man who died from fracture of the skull.

In spite of many conflicting results, I think a cytological examination may be of much service, for the majority of observers are agreed on the main statements. We must, however, bear in mind that exceptionally in tubercular meningitis the cerebro-spinal fluid has been found to be normal; in other cases there was a polymorphonucleosis, whilst in some cases of inflammatory meningitis there may very rarely be a lymphocytosis, either throughout the disease or following on an initial excess of polynuclears.

[1] Marcon–Mutzner : *Archives Gén. de Médecine,* September, 1901.

CEREBRO-SPINAL FLUID IN NERVOUS AND MENTAL DISEASES.

In addition to cases of meningitis, the cells in the cerebrospinal fluid have been enumerated in other organic and functional diseases, as well as in some forms of mental disease. In *tabes dorsalis*, Widal, Sicard, and Ravant[1] found marked lymphocytosis in 36 out of 37 cases; Babinski and Nageotte,[2] in 25 out of 26 cases; and Sicard in all of 14 cases in which the cerebro-spinal fluid was examined. Niedner and Mamlock[3] found lymphocytosis in only 5 of 9 cases of tabes, but one was interesting from the fact that the lymphocytes were increased during the gastric crises occurring in the case. Widal and Lemière[4] record a case in which they found lymphocytosis, where the first and only sign of subsequently fully developed tabes was the Argyll-Robertson pupil; Nageotte records a similar case where lymphocytosis of the cerebro-spinal fluid was the first definite sign of the disease.

In *general paralysis of the insane*, Maillard[5] and other observers have shown that lymphocytosis is also characteristic of general paralysis. Thus Siemerling[6] found this condition in 37 out of 38 cases, and Sicard in the whole of 17 cases of the disease in which he examined the cerebro-spinal fluid.

In two cases of general paralysis I examined, I found 70 per cent. and 78 per cent. respectively of lymphocytes, and in three cases of tabes there was marked lymphocytosis in all.

All observers are agreed of the great value of cytodiagnosis in these two diseases, as the lymphocytosis is found even in very early stages, thus permitting of the exhibition of antisyphilitic remedies at the only time when they are likely to do any good.

It would appear that *syphilis* affecting the central nervous system also causes lymphocytosis of the cerebro-spinal fluid. This may occur even in early stages and with very slight symptoms, but usually there is no excess of lymphocytes until some meningeal symptoms, however slight, are found. In a

[1] Widal, Sicard, and Ravant : *Revue Neurologique*, 1903, No. 8.
[2] Babinski and Nageotte : *Société médicale des Hôpitaux*, May. 1901.
[3] Niedner and Mamlock : *Zeitschrift für klin. Medicin*, Nos. 1 and 2.
[4] Widal and Lemière: Article on Cytodiagnosis in Bouchard's *Traité de Pathologie générale*, Vol. VI., p. 619.
[5] Maillard : "De la valeur clinique du cytodiagnostic céphalo-rachidien dans les cas douteux de paralysie générale," *Thèse de Bordeaux*, 1901.
[6] Siemerling : *Berliner klinische Wochenschrift*, May 23, 1904.

case recorded by Widal and Lutier, the lymphocytes have been seen to disappear from the cerebro-spinal fluid after anti-syphilitic medication.

Sicard found lymphocytosis in 6 cases of syphilitic meningo-myelitis, and Widal records a number of cases of syphilitic headache and asthenia in which the same condition was found. Niedner and Mamlock found excess of lymphocytes in 4 of 6 cases of hemiplegia, and in each of these 4 cases there was a syphilitic history. Widal and Babinski and Nageotte record similar cases. On the other hand, Maillard and Milian have recorded ordinary cases of secondary and tertiary syphilis in which they failed to find lymphocytosis. Dopter and Tanton [1] state that in a number of cases of syphilis of the central nervous system exhibiting symptoms, they usually found excess of lymphocytes in the cerebro-spinal fluid.

In *disseminated sclerosis* there is said to be lymphocytosis which may serve to distinguish this disease from some func-tional cases in which no lymphocytes are found. Carrière [2] found lymphocytes in all 3 cases of this disease which he examined, whilst Sicard found them in only 2 of 7 cases.

Whilst the above diseases show, with some exceptions, a decided preponderance of lymphocytes in the cerebro-spinal fluid, in the following diseases there have been no cells found :—

In *epilepsy*, as shown in 37 cases by Nageotte and Jamet [3] and also by others. In *hysteria and neurasthenia*, unaccom-panied by any organic lesions. In *syringomyelia*, as in 5 cases recorded by Sicard, the cytological count was negative.

In *peripheral neuritis, tetanus*, and *hemiplegia* due to vascular causes, the cerebro-spinal fluid showed the presence of no cellular elements. In the various forms of *mental disease* gene-rally, with the exception of general paralysis noticed above, no change has been noted in the cerebro-spinal fluid by Nageotte and Jamet, Duprè and Devaux, and other observers.

SUMMARY.

Briefly stated, the conclusions I think we are justified in drawing from the results of cytological examination are :—

[1] Dopter and Tanton : *Gazette des Hôpitaux*, No. 81, 1901.

[2] Carrière: *Comptes rendus de la Société de Biologie*, March, 1901.

[3] Nageotte and Jamet : *Société médicale des Hôpitaux*, January 17, 1902.

(1) In *pleural effusions* the cytological formulæ stated by Widal and Ravant hold good in the great majority of cases. An excess of lymphocytes indicates generally a tubercular origin ; a preponderance of polymorphonuclear cells an inflammatory process due, for instance, to a pneumococcal or streptococcal infection. A passive or mechanical transudation contains, as a rule, a large number of endothelial cells.

We must bear in mind, however, that, especially in the earlier stages of tubercular effusions, departures from the rule frequently occur.

(2) The *cerebro-spinal fluid in meningitis* of tubercular origin usually shows lymphocytosis, whilst in inflammatory states caused by the meningococcus of Weichselbaum, the pneumococcus or streptococcus, and in posterior basic meningitis it is characterised by an excess of polymorphonuclear cells.

Many discordant results, however, due it may be in some cases to a secondary infection, have been recorded.

Cytological examinations may thus help us not only in differentiating the various kinds of meningitis, but also in distinguishing meningitis from such conditions as the cerebral irritation of typhoid fever and other infectious diseases, from tetanus, and hysterical pseudo-meningitis, in which there is no increase of cells in the cerebro-spinal fluid.

(3) The presence of lymphocytosis is almost constant in *general paralysis of the insane*, in *tabes dorsalis*, in *syphilitic diseases* generally of the central nervous system, and may be useful for diagnostic purposes in distinguishing these diseases from other affections more or less resembling them. General paralysis and tabes promise to be diagnosed even in early stages by the use of cytological examinations, as shown by Maillard. The importance of early antisyphilitic treatment in these diseases is generally acknowledged, and cytology would seem to afford the means of making an early diagnosis.

I contend that in no case should a diagnosis be based wholly on the result of the cytological examination, but this should form merely a valuable link in the chain of clinical evidence. As in ordinary blood examination, I would emphasise the great importance of making more than one cytological count of the pleural or cerebro-spinal fluid whenever this is possible.

Prize Essay.

THE TREATMENT OF DIPHTHERIA.

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RATIONAL treatment of disease must be based on a sound pathology and on a sufficient knowledge of pharmaco-dynamics.

In dealing with the treatment of diphtheria, it will further be necessary to realise that granting that a certain combination of symptoms and signs constitute a clinical entity—or disease which can definitely be termed diphtheria—so also there exist atypical or aberrant cases in which one or more or nearly all of the clinical symptoms and signs of typical diphtheria are wanting. These cases do not answer to the older text-book descriptions of diphtheria, but it is of the highest importance to the public health that their existence should be recognised in order that appropriate treatment may be adopted.

Bacteriology has altered the older views, and many cases must now be included under the term of diphtheria which would formerly have not been so called. On the other hand, many cases which formerly would have been termed diphtheria, on account of a visible deposit on the tonsil, can now by bacteriological assistance be excluded.

Yet in no instance in which there is really room for suspicion should absolute dependence be placed on a *single negative* bacteriological result. It is quite possible for the diphtheria bacillus to be present in a throat or nose, and yet be missed by faulty manipulation of a swab, antiseptic treatment, &c.

To produce any pathogenic process of an infective nature two points are essential :—

(1.) A suitable infective organism.

(2.) A suitable soil for its growth and for the production of its toxins.

This latter covers what is generally known as "suscepti-bility" to a disease.

In diphtheria the infective organism generally finds lodg-ment on a mucous membrane, almost always in the upper respiratory passages. The organism may remain purely local, or it may be carried by the blood or lymph to the internal organs, such as the spleen and the kidneys, but in any case it is capable of forming a manufactory of its toxins wherever it may be lodged, *cæteris paribus.*

The local growth of the organism is generally accompanied by the formation of a membrane composed of fibrinous material, brokendown epithelial cells, diphtheria bacilli, &c. But it is the toxins which chiefly interest the therapeutist, for it is these which really cause the local necrosis, the destruction of red blood cells, the diminution of hæmoglobin, the subnormal temperature, the subsequent pareses, the primary nerve degenerations, the fatty degeneration of the cardiac muscles and the degeneration of the cardiac nerve centres, &c., which form the pathological picture of advanced diphtheria.

The ultimate pathological conditions are analogous to those produced by serpent venom, but the diphtheria toxins act less rapidly. This analogy must be borne in mind in discussing treatment.

Another point is that, in a large proportion of cases of diphtheria, mixed infective processes have to be reckoned with. Streptococci, staphylococci, pneumococci, yeasts, and other organisms are frequently found associated with Klebs-Lœffler bacilli in diphtheria, often leading to serious complica-tions. In such cases treatment must necessarily be complicated and prognosis uncertain. Another important point is the relative susceptibility of individuals and families.

TREATMENT.

More immediately in connection with the treatment of diphtheria the names of Behring, Ehrlich, Aronson, Roux, and Martin stand out pre-eminent.

In the treatment of diphtheria the fact to be grasped beyond all others is this—directly there is a suspicion that a case might possibly be diphtheria, antidiphtheria serum should be

administered without delay with proper precautions. Having done this first we may then have the suspicion of diphtheria confirmed or otherwise by bacterioscopic aid. Serum treatment should never be deferred pending a bacteriological report. If the bacteriological result is negative, the result of a single examination does not disprove that the case is diphtheria, while, on the other hand, properly prepared antitoxin, if administered with proper precautions, can do no harm even if the case is not diphtheria.

With our present-day knowledge that diphtheria is practically rendered *non-fatal if treated with a suitable dose of diphtheria antitoxin on the first day of illness*, it is almost criminal to defer serum treatment until a bacteriological examination has been made.

Further, antidiphtheria serum not only has a specific effect on specific diphtheria, but also has been found to be of benefit in some forms of sore throat (particularly scarlatinal) in which repeated examination has failed to detect Klebs-Lœffler bacilli.

Seeing then that no harm results, and that the time gained is of incalculable advantage, 2,000 units of good and reliable serum should be administered subcutaneously directly there is a *suspicion* that the case might be diphtheria. Should the suspicion be confirmed by bacteriological examination, a further dose of 2,000 units can then be given, if deemed necessary.

A word of caution is necessary as to the mode of administration. The writer has seen letters, contributed to the medical journals by practitioners, advocating, on the extremely limited experience of three or four cases, the administration of diphtheria antitoxin by the mouth or rectum. Now Hewlett has shown by laboratory experiments how inefficacious such method of administration is.

As a matter of common logic, it is evident that the varying chemical contents of the stomach must be prone to alter the chemical constituents of the serum before absorption can occur, and in any case such absorption must necessarily be delayed.

On the other hand, the subdermal method ensures speedy absorption, and the risks of chemical change are practically non-existent. In desperate cases the advisability of large doses, administered intravenously, should be duly considered,

but at so late a stage in this disease only a modified advantage could accrue, for the following reasons :—

A large amount of toxin has already entered into combination with nerve and other tissue cells. Clinical experience seems to support Ehrlich's " Seitenkette " or " side-chain " theory of immunity. The great object of specific antitoxin treatment is to forestall the toxins and prevent them from combining with the body cells. When once toxins have combined with the tissue cells, antitoxin has but little neutralising effect on those particular combined toxins. The late administration of antitoxin will, however, prevent the *further* absorption of toxins which, in severe cases, are still in rapid process of formation in extremely large quantities. Hence in severe cases large doses of antitoxin, administered intravenously (in order to gain a few minutes or hours), are indicated to neutralise the large quantities of toxins yet uncombined, and which would surely quickly kill the patient if absorbed. But the patient may have even already absorbed a fatal dose of toxins. In such a case the antitoxin treatment would necessarily fail no matter what quantities of antitoxin were administered. The time for antitoxin treatment would have passed by.

I am of opinion that the value of diphtheria antitoxin is almost entirely of a preventive nature by anticipating the combination of toxins with tissue cells. Hence diphtheria antitoxin in a limited sense belongs more to preventive than to curative medicine. It cures a diphtheria patient when injected early, in an indirect manner, by combining with the toxins, allowing the phagocytes (which would otherwise be paralysed by the toxins) free play to wrestle with the invading bacilli.

It is all important that a sufficient quantity (at least 2,000 units) should be given on the first or second day of the disease. At any later stage, or if there is already pallor, or much membrane, a double or treble dose should be immediately administered in order to ensure the neutralisation of the greater quantities of uncombined toxin which are then present.

Next to the specific treatment by diphtheria antitoxin, one drug stands out pre-eminently as specially indicated in diphtheria. The writer uses it largely and freely in every case of diphtheria he sees. It is strychnine. This drug is commonly prescribed in diphtheria in ludicrously inadequate doses. The

writer argues thus.   In diphtheria we are dealing with a poison
the results of which are directly antagonistic to the physio-
logical action of strychnine.   This diphtheria poison is being
manufactured on a large and increasing scale (until antitoxin is
administered), and must be met by correspondingly large doses
of its physiological antidote.   Accordingly, the author gives
what some might deem heroic or even dangerous doses of
strychnine in the treatment of diphtheria.   To some children
he has given nearly half a grain (0·03 grm.) of strychnine a
day in divided doses during several consecutive days, followed
by lessened doses for subsequent weeks.   He has never seen
any but good results.   During 1904 he treated 32 cases of
diphtheria without a death.   During 1901, 1902, and 1903 he
treated 147 cases with only 11 deaths, and 4 of these were
moribund when they first came under treatment.   During the
last 4 years he has treated 179 cases with only 11 deaths, or a
case mortality of only 6·1 per cent.

Such results justify a strong recommendation of an increased
dosage by strychnine in diphtheria.   In the early days of the
disease the writer combines strychnine with the euchlorine
mixture of Burney Yeo, chiefly on account of the cleansing
and local disinfecting value of the latter.   A few days later the
patient is given a mixture containing tincture of perchloride
of iron and strychnine.   The perchloride of iron is another
drug of immense value.   In varying degrees it is antiseptic,
germicidal, and blood-restoring.   The use of this drug in diph-
theria is almost universal, based chiefly, no doubt, on the
affinity of iron for the protoplasm of the xanthocytes, by
combining with the hæmoglobin.   But, in addition, iron has
long been empirically used for a specific tonic effect in
adynamic diseases such as erysipelas and diphtheria.   Probably
a considerable proportion of the explanation of its general
tonic effects in these diseases is to be found in the chemical
changes of the drug within the body, giving rise to free chlorine
in small quantities acting as a general circulating antiseptic.
The increase of iron in the hæmoglobin also increases the
oxygen-absorbing power of the red cells.

The necessity for *rest* in bed in diphtheria varies with
almost each case.   In a large majority of the cases, in which
antitoxin is used on the first or second day, the patient can be

allowed to get up in a week's time. There can be no rigid rule in this matter.

Colour and pulse rate are the chief guides in determining the length of stay in bed after the disappearance of all membrane formation. In some instances the recumbent position is necessary for three weeks or more.

The *diet* in diphtheria, again, varies according to the individual case. In cases where there is much soreness of the throat, and generally during the early days of treatment, a milk diet is indicated, allowing also beef-tea, &c., and an egg beaten up every day. In most cases the child is ready for ordinary diet in three or four days' time, when he is at the same time placed on the iron and strychnine mixture.

To what extent is albuminuria a contra-indication to a generous diet ? The writer's experience is that cases, early treated with antitoxin, do not develop albuminuria. In any case, unless the urine is very scanty, he does not consider diphtheritic albuminuria contra-indicates a dietary containing one egg and half a pint of beef-tea daily. Albuminuria is, however, a contra-indication to chlorate of potash as given in the euchlorine mixture. In these cases it is as well to at once place the patient on iron.

The value of raw meat-juice in severe diphtheria is perhaps not sufficiently appreciated. The writer has found it of great value in severe cases with marked pallor and deficient hæmoglobin. It is a very useful aid to iron in this respect. Constipation, if present, is perhaps best met by calomel in small doses followed by a saline or senna.

THE TREATMENT OF COMPLICATIONS.

Complications are rarely if ever seen in cases treated early with proper doses of reliable antitoxin. If no delay has occurred in seeking reliable medical advice, diphtheria ought to be an almost non-fatal disease. But where delay or mismanagement· has allowed the golden opportunity to pass, the well-known complications of diphtheria may all still be met with.

For the various forms of paresis no treatment will compare with ιarge medicinal doses of strychnine. If there is a threatening of cardiac failure, absolute rest in bed must neces-

sarily be enjoined. The writer does not advocate the use of digitalis unless the pulse is very rapid. Digitalis is apt to upset the digestive organs ; moreover, it is of questionable value in any case in diphtheria. Not so with strychnine, which is of high value as a heart-supporter as well as a general nerve tonic. Strychnine is also a powerful antiseptic, and it being possible to give this drug in such considerable relative quantities in diphtheria, no doubt permits of its antiseptic properties also having some effect. Strychnine also tends to arrest any constipating action of the iron so freely prescribed in diphtheria.

Strychnine has a great affinity for nerve cells, more especially the motor centres ; also the respiratory centre, the cardiac centre, and the vaso-motor centre. These are the very parts which are attacked by the diphtheria toxins with a directly opposite effect. Hence in many ways strychnine is a direct physiological antagonist of diphtheria toxins, and is, in the writer's opinion, more successful even than diphtheria antitoxin in ousting or neutralising those diphtheria toxins which have already entered into combination with the nerve cells.

Except in those instances where diphtheria begins as an intralaryngeal affection, it is comparatively rare to meet with laryngeal complications in these days of enlightened treatment. Hence the occasions for resorting to tracheotomy for the relief of laryngeal obstruction are less frequent. Personally, although the writer has treated nearly 200 cases of diphtheria during the last four years (including a few laryngeal cases), he has not had to resort to tracheotomy in a single instance. Large and repeated doses of antitoxin, with the temporary use of a steam tent, have hitherto speedily relieved obstruction in a few hours, even when there had been marked retraction of the intercostals and epigastrium, with the other well-known croupy symptoms. In the writer's opinion, tracheotomy ought never to be performed until time has been given for the effects of antitoxin, unless the case is so desperate that it is only a question of a few minutes before suffocation must ensue.

The writer has had no experience of intubation as an alternative to tracheotomy. Primâ facie intubation would appear to be preferable, if one or the other was absolutely imperative, because a cutting operation, which is sometimes difficult or awkward, is thereby avoided; but intubation requires a very

considerable amount of manipulative skill, which can hardly be acquired by a general practitioner with very rare opportunities of practising the operation. Nasal feeding is occasionally required in the severer cases of pharyngeal diphtheria.

Rhinitis is a frequent complication of diphtheria. It is indeed so frequent that nasal discharge may be looked for in at least 75 per cent. of severe cases. Occasionally the nasal septum or the post-nasal fossæ are the nidus of the affection, while the pharynx may be unaffected. These nasal cases of diphtheria are of supreme importance, but unfortunately are often overlooked. In any case of sore throat it should be made an invariable custom to inquire into the condition of the nose. A thin nasal discharge or an excoriated nostril is extremely suspicious.

In every case of diphtheria affecting the air passages, it is wise to institute four- or six-hourly antiseptic douchings of the nasal and pharyngeal passages. It is advantageous to ring the changes on such solutions as Hydrarg. Perchlor., 1-1000 ; Lysol, 2 per cent. ; Formalin, $\frac{1}{2}$ per cent. ; Permanganate of Potash, &c. A useful method at times is a nebulising spray. A solution of Menthol in Toluol and Alcohol can be conveniently used with a nebuliser. Lœffler's solution is—Menthol, 10 grm. ; Toluol 36 cc. ; Liq. Ferri Sesquichlorat., 4 cc. ; abs. Alcohol, 60 cc.

In conclusion, there can be no doubt that the treatment of diphtheria is best carried out at an Infectious Diseases Hospital, but where it is decided to treat the patient at home it is necessary to bear in mind all that is meant by complete isolation of the patient and of his nurse, also the value of free ventilation of his apartment, &c.

As these apply to infectious diseases in general it is not deemed requisite to specify the requirements in detail here.

(*Some additions have been made to the original Article.* —ED.)

ATTEMPTS TO FIND A SPECIFIC REMEDY FOR TUBERCULOSIS.

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THE subject of the treatment of consumption is one of perennial interest for the practitioner. Within recent years we have made great advances in the hygienic treatment of the disease, yet we still frequently meet with cases in which hygienic measures combined with the intelligent use of drugs have had the fullest application without curing the patient, without, in some instances, any apparent influence in temporarily improving his condition. Under these circumstances, our thoughts naturally turn to a sphere of therapeutics, which has already won marked triumphs in other diseases, and is destined undoubtedly to win many more—I mean the employment of protective serums. The object of the present paper is to give some account of the serums and allied substances which have been used in the treatment of tuberculosis, and to form some estimate of their value.

It is usual to divide microbic diseases into those which are toxæmic and those which are infective. In the toxæmic class the microbes do not invade the body, but multiply on a surface or wound, producing the symptoms of disease by means of a soluble toxine acting upon structures at a distance. The best known examples of toxæmias are diphtheria and tetanus. In the infections, on the other hand, the symptoms of the disease are closely associated with the presence of the microbe in the tissues. The microbe itself is toxic, and secretes a toxine which damages the tissues in its immediate neighbourhood, but does not cause toxæmia in the above-mentioned sense. Tuberculosis is an infection, and the tubercle bacillus can be demonstrated in every tubercular lesion—sometimes easily and sometimes with difficulty.

Hence it will be seen that the problem for the cure of diphtheria by means of a specific serum is easier of solution than the cure of tuberculosis. The toxine in the one case is

freely circulating in the blood, and can be neutralised by means of the appropriate antitoxine derived from a highly immunised animal. But in the case of tuberculosis it is questionable whether any purely antitoxic serum will ever succeed, because the toxine is not widely diffused. The serum must, in fact, be antibacterial—that is, must contain a substance which either kills or inhibits the growth of the bacteria. It has, so far, not been found possible to produce any antibacterial serums which can approach the efficacy of diphtheria antitoxine. As illustration of this, we may take the uncertain effects of antistreptococcus or antipneumococcus serum.

Tuberculosis differs markedly from many other bacterial diseases, in the fact that one attack does not confer immunity against subsequent ones. In these the presence of immunising substances in the blood brings the morbid process to an end within a well-defined period ; the tubercular process, on the other hand, runs on indefinitely, with no self-limiting, natural term of existence. As regards susceptibility, everyday experience teaches us that individuals vary very much in their powers of resistance. Undoubtedly, in many cases, the tuberculous process undergoes a spontaneous cure, as is proved by fibrous scars or calcareous masses found in the apices of the lungs of persons who have died from other diseases. The progress of a tubercular infection is very similar to the progress of lesions caused by other infective microbes, as, for instance, the pyogenic cocci. Where the bacteria provoke an efficient resistance, the diseased tissues become surrounded by a zone of leucocytes, and ultimately by a capsule of fibrous tissue. The scar-tissue which replaces a once active tubercular infection marks the site of the victory of the tissues over the microbes. We do not know exactly how the victory is obtained, and the words need not be taken as an acceptance of the doctrine of phagocytosis in the original sense. Where the reaction of the tissues is inadequate the disease gradually spreads locally, or by invading blood-vessels may become widely disseminated. The tissue-cells, especially the leucocytes, probably secrete substances which inhibit the growth of the microbes. Whatever means we use for the arrest of tuberculosis can only effect the object in view by assisting the processes by which the natural arrest of the disease is effected. Remedial agents which increase

the number of white corpuscles in the blood have been largely
used in the treatment of tuberculosis.   To this class belong
yeast, either crude or in the form of nuclein, and cinnamate of
sodium—also known as hetol.   According to Landerer, the
author of the latter method, the drug should be given by
intravenous injection, the result being a marked leucocytosis.
The hypodermic injection is of far less value.   The tendency
of the liberal allowance of food, especially proteid, which is
usually given to consumptives, is to maintain a condition of
leucocytosis, and this is probably one of the factors by means
of which an increased amount of food brings about an increased
tissue resistance.   A large amount of butcher's meat is usually
considered necessary in the consumptive's diet, but Dr.
Bardswell has shown that equally good results may be obtained
by the substitution of vegetable proteid.[1] The obvious objec-
tion to an exclusively vegetarian diet is the large amount of
waste material, which is apt to cause serious disorder of the
digestive organs.   Dr. Philip strongly advocates a raw-meat
dietary.[2] Dr. Dora Bunting, of the Sherwood Forest Sana-
torium, as the result of a number of observations on patients
taking ordinary full diet, has found the leucocytes number from
7,000 to 20,000.   In most cases, however, they were nearer
the former figure, which cannot be considered a very notable
increase, if we take 7,500 as representing the average of health.
The tendency of a pure tubercle infection, especially miliary
tuberculosis, is towards leucopenia, but where there is mixed
infection leucocytosis is the rule.   This admixture of pyogenic
cocci in tubercular processes may greatly accelerate destruction
of tissues, and necessarily interferes with the success of serums
intended to counteract the tubercle bacillus.   It is not very
surprising that streptococci are to be found in cavities commu-
nicating with the air, and even in caseating portions of the
lung ; but we are not prepared at the outset for the presence of
these organisms in miliary tubercle also.   This is, however, the
case sometimes ; for if the pus cocci exist in a focus which
leads to a general tuberculosis, they may be disseminated along
with the tubercle bacilli.

[1] These researches are not yet published, and the results were communicated
privately to me by Dr. Bardswell.

[2] THE PRACTITIONER, January, 1905.

The first attempt to arrest the tubercular process by means of substances of bacterial origin was made by Koch in 1890, when he introduced the use of tuberculin. This substance is obtained from old cultures of tubercle bacilli, filtered free from germs. It contains a large proportion of glycerine, and some of the toxines formed by the growth of the bacillus. If a small dose, say, 1 milligramme, of tuberculin be injected into a person suffering from tuberculosis, there follows after a few hours a sharp rise of temperature accompanied by inflammation of the tissues surrounding a tubercular focus, as can actually be seen in the case of lupus on an exposed surface. It is very important to bear in mind this specific action of tuberculin on tubercular foci of disease. Amid the general disappointment at the failure of the substance to realise the exaggerated hopes which its introduction excited, the fact has too much been lost sight of that this is the only preparation known capable of exerting a specific effect on tubercular tissues. Apart from all questions of treatment, this property of tuberculin makes it, under certain circumstances, a useful diagnostic agent. The above account refers to Koch's old tuberculin, the substance originally devised ; but as modifications have subsequently been introduced it will be more convenient to defer the consideration of these until something has been said on the subject of serums.

One of the best known antitubercular serums is Maragliano's. He obtains his toxic material from sterilised cultures, which are used for immunising horses. After some months the serum is drawn off. A cubic centimetre of the serum is injected for a dose. This quantity will also render inert an amount of tuberculin sufficient to cause a reaction. It is said to be bacteriolytic as well as antitoxic, as tubercle bacilli are rendered inert and incapable of growth on artificial media after being kept some days in the serum. During its use patients are kept in the open air and well fed, just as in a Sanatorium. Statistics of results in 2,900 cases have been published.[1] It was found that of circumscribed apyretic cases, 38 per cent. were cured ; of circumscribed febrile cases, 18 per cent. ; of diffuse tubercular bronchitis, 14 per cent. ; advanced cases with cavities, 5·6 per cent. These figures bring out the well-known

[1] Bosanquet: *Serums, Vaccines, and Toxines*, p. 277.

facts that the result depends so much on the stage of the disease in which treatment is commenced, and on the type of the disease. Further, the figures do not, to my mind, show any improvement on Sanatorium statistics, because it is fairly well established that about one-third of such cases attain practical cure and regain the power to work, whereas a much larger proportion, something like 80 per cent. of cases, in which there is limited infiltration, get quite well. Other observers have not obtained even the limited amount of success from the use of Maragliano's serum which is indicated by the above statistics.

Another serum has been devised by Marmorek, late of the Pasteur Institute, Paris, who is also known as the originator of an antistreptococcus serum. He gives reasons for his belief that Koch's tuberculin does not contain the true tubercular toxine. By growing the bacilli on specially devised media he has prepared a toxine which is used to immunise horses, which in time are made to yield the antitoxic serum. This serum, when injected into persons suffering from tuberculosis, is said to reduce fever, and cause general improvement. One case of acute tuberculosis is reported to have got quite well. Marmorek's serum has been introduced into this country by Dr. Arthur Latham, who published a preliminary report in the *Lancet* for April 9, 1904. He informs me in a private letter, dated October, that he still considers the serum worthy of trial. The dose is 5 cubic centimetres given daily for four days with aseptic precautions, followed by an interval of three days' rest. Thus the serum is given intermittently for a considerable period. Even in bad cases it seems to have the power of reducing the temperature ; while, on the other hand, if the dose be too large apyrexial cases may be converted into febrile ones. It is well known that the injection of horses' serum, quite apart from its antitoxic quality, is liable to occasion skin rashes, malaise, rise of temperature, and other unpleasant effects. It is obvious that these by-effects must be a serious obstacle to the employment of the serum in such a chronic disease as tuberculosis, and, in the case of very intolerant persons, prohibit its use altogether.

Dr. Nathan Raw, of Liverpool, has suggested that the serum derived from tubercular bovines might be used as an antitoxine

for the treatment of phthisis. He considers that most juvenile forms of tuberculosis—such as those affecting the glands, joints or meninges—are of bovine origin, and that individuals who have recovered from them are immune against the human strain of the bacillus. In like manner, he argues that bovine serum may with great probability be antagonistic to the bacillus growing in the human lung.

The tubercular toxine appears to be intimately associated with the bodies of the bacilli, and is not easily given off into culture media. Hence it seems doubtful whether antitoxic serums which do not attack the toxic bacilli themselves will ever prove of great service. This principle has been at the bottom of Koch's later researches on tuberculin. In 1897 Koch introduced the substance known as "tuberculin R." which contains dead bacilli ground up and suspended in the fluid in the proportion of 10 milligrammes of solid substance in each cubic centimetre. The dose to commence with is $\frac{1}{500}$ of a milligramme of solid substance, which is still further reduced if a reaction occurs. The latest modification, known as "new tuberculin," was brought out in 1901, and consists of finely-powdered bacilli suspended in 50 per cent. glycerine, the dose being of a $\frac{1}{400}$ milligramme. The dilutions are made with sterile salt solution, but before being used the fluid should be heated to 60° Cent. for an hour, lest it should contain living bacilli. The action of these later tuberculins is essentially different from the old. They cause a reactive pyrexia indeed, if given in sufficiently large doses ; but, unlike the old tuberculin, do not cause active inflammation of the tubercular focus. The *rationale* on which the use of the original tuberculin was based was of twofold character, namely, the completion of the necrotic process begun by the bacillus, and the establishment of a line of demarcation against its further inroads. The object in view in using the new tuberculin is to employ it as a vaccine, on the same principle as that with which other vaccines are used, namely, by means of an attenuated virus to accustom the tissue-cells to tolerate a stronger virus. The agglutinative power of the blood-serum, as in the case of typhoid fever, has been used to measure the patient's increased resistance which is brought about by the tuberculin injections. Tubercle bacilli naturally grow in clumps, hence special means have to be used

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to prepare a suitable test medium. Both Koch and Professor A. E. Wright have found the agglutinative power of the blood increased by the use of tuberculin injections, but Wright has pointed out that the salt solution used to dilute the bacillary emulsion should not be stronger than ·1 per cent.

Wright has also devised a new method of estimating the power of a patient's blood to resist the invasion of the tubercle bacillus; but unfortunately the elaborate technique involved in the method renders it difficult of application for clinical purposes. The test itself consists in mixing together (1) the patient's serum, (2) leucocytes, (3) tubercle bacilli; and, after 15 minutes, estimating the degree of phagocytosis. The latter phenomenon depends on the presence in the serum of a protective body called opsonine, from its power of acting on the bacilli, and rendering them liable to be attacked by the leucocytes. The opsonic content of the serum of tubercular patients is generally below normal. Wright has shown that this can be increased by the injection of tuberculin at properly spaced intervals. In fact, if the test can be brought into ordinary clinical application, it will be a most important guide to the administration of tuberculin. Usually the first injection induces a negative phase; that is to say, a reduction of the protective elements in the blood, to be followed by a positive phase when the organism becomes more resistant than at the first. The object of frequent and systematic blood exami-nations is to avoid giving a fresh injection during a negative phase, for by so lowering resistance we should be encouraging the spread of the disease. By properly spacing the injections, avoiding the induction of a prolonged negative phase, it is possible to maintain the increased opsonic value of the blood for long periods. Wright[1] has published a series of cases, otherwise incurable, but which have shown remarkable im-provement under the use of tuberculin as advised by him. Among the cases are diseased glands and inveterate scrofulo-derma, tuberculosis of the urinary passages, disseminated lupus, chronic joint disease, chronic discharging psoas abscess, &c.

Good results from the use of tuberculin have also been obtained by Moeller of Berlin.[2] He treated one section of

[1] *Lancet*, October 22, 1904.
[2] *Brit. Med. Journal*, Epitome, October 29, 1904.

patients with tuberculin, and another without. In the former class the number of patients cured, or greatly improved, was more than double those in the latter. All the cases had the advantage of sanatorium treatment in addition.

It is too early as yet to form any final opinion as to the value either of serum or of tuberculin treatment. So many cases make such satisfactory progress under sanatorium treatment, that one feels loath to introduce anything which may have a disturbing influence. At the same time, however, in this class of case the disease may become quiescent, but the patient does not get well. Where the most attainable improvement has been effected by sanatorium treatment, where the disease becomes quiescent but does not die out, I think there will be a useful field for the employment of the new tuberculin, given with the idea of inducing the body-cells to secrete protective substances. In the mixed infections, where streptococci often exercise a baneful influence, an appropriate vaccine may enable the patient's tissues to successfully combat these organisms. Koch uses a modified tuberculin even in febrile cases, but the majority of observers only employ it when the temperature is normal or thereabouts. It is probable, however, that a moderate degree of fever is not a contra-indication to the tuberculin treatment, for Wright[1] quotes one of his cases, in which the temperature came down from 100° to normal shortly after the injections were commenced. For cases with persistently high fever one of the serums, Maragliano's or Marmorek's, might be tried.

[1] *Clinical Journal*, November 9, 1904.

A REVIEW OF RECENT INVESTIGATIONS ON THE PHYSIOLOGY AND PATHOLOGY OF SECRETORY TISSUES.

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I. *Stomach.* — In recent years various operations have been performed for the relief of hæmatemesis, with the result that our knowledge has been considerably increased respecting the various lesions which may be responsible for the hæmorrhage. In a certain proportion of these cases, operators, instead of meeting with the more familiar peptic ulcer, have found that the hæmorrhage has proceeded from numerous bleeding points, or small multiple erosions have been discovered, so that a new term has been introduced for their description, viz., " Erosive Gastric Ulceration."

These erosions, unlike the peptic ulcer, which may involve the whole thickness of the stomach-wall and be even continued as destructive lesions involving adjacent organs such as the liver, are practically confined to the mucous membrane, and relief of the hæmorrhage has been secured by passing purse-string sutures around the erosion (*vide* Report on Sir Dyce Duckworth's case, *Transact. Clin. Soc. Lond.*, 1904, p. 1). Mansell Moullin had found similar lesions in the majority of eleven cases of severe hæmatemesis ; although, according to the latter observer, the hæmorrhage may be relieved by this procedure, recurrence of hæmatemesis may occur (*Brit. Med. Journal*, 1903, Vol. II., p. 987, and *Clinical Journal*, 1902, Vol. XXI., p. 72). Whether such cases are distinct from cases of peptic ulcer, or are early stages of the development of such condition, is at present not decided. The nature of the pathogenesis of erosive gastric ulceration is possibly greatly elucidated by an experimental inquiry carried out by Bolton (*Proceedings of the Royal Soc.*, Vol. 74, p. 135) in the production of a specific gastro-toxic serum. A gastrolysin consisting of a complement and of an immune body, the latter endowed

with at least two cytophilic affinities, can be produced by injecting an emulsion of the glandular cells of the stomach-wall of guinea-pigs into the peritoneal cavity of rabbits, the stomach-wall having previously been washed free from blood by physiological salt solution. The serum of rabbits thus treated, exerts no harmful effects upon the stomach-wall of other rabbits when injected into them, probably because one of the cytophilic affinities of the immune body produced, is rendered harmless by the production simultaneously of an anti-immune body, but the serum, when injected into a guinea-pig, rapidly produces multiple erosions in the mucosa of the stomach of the animal, such erosions apparently bearing close resemblances to the erosive gastric lesions met with in man.

II. *Intestine and Pancreas.*—Much advance has been made in the study of the physiology of the intestinal mucous membrane and of the pancreas, and also in the study of the nature of the relationship which exists between the succus entericus and pancreatic secretion. The acid of gastric-juice in entering the duodenum and the rest of the small intestine acts upon a body described by Bayliss and Starling (*Journ. of Phys.*, 1902, Vol. XXVIII., p. 325) as "Prosecretin," which is present in the epithelial cells of the mucous membrane of this part of the bowel and converts it into another body, "Secretin." This latter substance is absorbed into the vascular system and ultimately reaches the cells of the pancreas, which are, by its means, stimulated to form an inactive substance "Trypsinogen" as well as active "Trypsin," though the latter is formed in a much less amount (Chepowalnikoff, *Thèse St. Pétersbourg*, 1899). This inactive trypsinogen is activated by contact with a substance known as "Enterokinase," an ingredient of the succus entericus, with the result that the trypsinogen, though originally incapable of acting at all on coagulated proteids (*Delezenne*, *Compt. rend. de la Soc. de Biol.*, 1902, T. LIV., p. 241), and only slightly on uncoagulated proteids such as fibrin or caseinogen (Bayliss and Starling), becomes actively proteolytic. This ferment enterokinase, which is thus capable of activating another ferment, has been also called "Zymolysin." Camus and Gley (*Compt. rend. de la Soc. de Biol.*, 1902, T. LIV., p. 241) point out that intravenous injection of acids is unable to lead to the formation of secretin from the epithelial cells of

the intestinal mucous membrane, and further, that the intra-
venous injection of an acid extract of duodenal mucous
membrane will provoke a pancreatic secretion which, however,
will not digest proteid, but such secretion may be activated
" in vitro " by the addition of an extract of mucous membrane
which contains enterokinase or zymolysin—this may be called
an " extra-pancreatic " conversion of trypsinogen into trypsin.
These two authors find, however, that there is another method
by which an actively proteolytic pancreatic secretion may be
obtained directly from the pancreatic duct, by the injection
of a filtered digested stomach content or of Witte's peptone
(2-10 c.cm. of a 1 per cent. solution per kilo. of animal). This
process they describe as an " intra-pancreatic" conversion of
trypsinogen into trypsin.

Proteids, which have been introduced through the mouth,
are by the action of peptic and pancreatic ferments converted
into soluble proteids, peptones, &c. Cohnheim has shown
that the succus entericus contains another important con-
stituent, viz., " Erepsin " : this ferment is indifferent to albumen,
but is capable of splitting albumoses and peptones into sub-
stances containing still smaller molecules, thus completing
their preparation for absorption into the system. Erepsin
acts on syntonin converting it into tyrosin, leucin, ammonia,
arginin, lysin, and histidin ; amphopeptone, proto- and deutero-
albumose are also quickly acted upon by erepsin, but hetero-
albumose and antipeptone much more slowly (*Zeitschr. f.
physiol. Chem.*, No. 35, s. 134). Cohnheim in a further com-
munication (*Ibid.*, No. 36, s. 13) concludes that erepsin, as
secreted in a Vella's intestinal loop which is free from trypsin,
is capable of effecting the cleavage of proteids sufficient for
the needs of the animal, so that in some pathological con-
ditions erepsin can replace trypsin, just as in other pathological
conditions trypsin can perform the rôle of pepsin.

Vernon (*Journal of Physiol.*, 1904, No. XXX., p. 330)
shows that erepsin exists also in the pancreatic juice, differing,
however, from that found in the bowel, the latter secretion
having a more energetic action in the later stages of the
digestion of peptones, and being apparently destroyed by a
strong solution of soda. The argument in favour of the
existence of erepsin in the pancreatic juice is supported by

the observation that when a pancreatic secretion is obtained containing only trypsinogen, which is unable to split into simpler substances, fibrin, egg albumen, and other similar proteids, it is capable of energetically splitting albumoses into simpler bodies which no longer give the biuret reaction : by adding two-thirds of a volume of alcohol, the erepsin present in pancreatic juice can be practically precipitated, and then separated, from the trypsinogen, which passes into the filtrate.

The above observations are confirmed by observations in man. Hamburger and Hekma (*Journ. de physiol. et de path. génér.*, 1904, T. VI., p. 40) obtained intestinal juice by the introduction of a tube into an intestinal fistula : intestinal juice thus obtained, if kept antiseptically, remains active several months. It inverts cane sugar, but does not influence milk- or grape-sugar. It digests albumoses and casein until the biuret reaction is no longer given : it does not attack egg albumen. If the juice is heated for half an hour to 62° C., the erepsin contained will be destroyed, but the enterokinase or zymolysin will remain unaffected. Glaessner (*Zeitschr. f. physiol. Chem.*, 1904, s. 465) reports on the pancreatic juice obtained from the pancreatic duct in man. He found that the secretion, in agreement with the results of Pawlow, Chepowalknikoff, and Delezenne, does not digest proteid unless intestinal juice obtained from the post-mortem room is added. Intestinal juice obtained from the dog was incapable of activating the juice— an important observation in view of the attemps made to employ the succus entericus of lower animals when such secretion is deficient in man. The administration of hydrochloric acid by the mouth was followed by an increased flow of pancreatic juice, which sank again to normal in an hour : alkalies and fat taken by the mouth produced no such effects, and the diastatic ferment present in the juice converted starch into maltose, but did not attack cane-sugar or maltose.

An interesting example of the adaptability of the pancreas is shown by the observations made by Bainbridge (*Journ. of Physiol.*, 1904, Vol. XXXI., No. 2, p. 98). In early life pancreatic juice contains lactase, which converts lactose into galactose and dextrose. Glaessner (*vide supra*) found this ferment absent in his patient and in adult dogs. If an adult animal, however, be fed for a few weeks on milk, the pancreatic

juice will then be found to contain lactase, the lactose of the milk acting on the mucosa of the intestine producing a substance which is carried by the blood to the pancreas, and this organ is thus enabled to produce lactase.

Delezenne (*Compt. rend. de la Soc. de Biol.*, 1902, T. LIV., p. 590) finds that there is a kinase present in lymphatic glands, in the leucocytes present in pathological exudates, and in the normal leucocytes of the blood. This kinase, like enterokinase, is capable of activating pancreatic juice, converting trypsinogen into trypsin. It has been found that fibrin can be slowly digested by inactive pancreatic juice, and Delezenne points out that this is probably due to the entanglement in the fibrin of a certain amount of kinase derived from leucocytes during the process of conversion of fibrinogen into fibrin as a result of the disruption of leucocytes; the entangled kinase activates a certain amount of the inactive trypsinogen which otherwise is quite incapable of acting upon coagulated or uncoagulated proteid. If fibrin be first heated for ten minutes at the temperature of boiling point, it is no longer capable of being digested by inactive pancreatic juice. The kinase present in fibrin is not only capable of activating trypsinogen against fibrin, but is also capable of activating it against other proteids, because, if fibrin is macerated in salt solution, it gives its kinase to the solution, and the latter makes inactive trypsinogen capable of digesting albumen.

It has occurred to many that possibly physiologists had not paid sufficient attention to the digestive activity of bacteria present in the various fluids obtained from the pancreas and bowel, and Delezenne (*Ibid.*, p. 998) calls attention to these possible fallacies. Not only are bacteria or their derivatives capable of digesting proteids, but Delezenne finds that bacteria are capable of activating inactive proteid-digesting ferments such as trypsinogen. He found that if he allowed bacillus subtilis, the Finkler-Prior bacillus, or the bacillus mesentericus vulgatus to develop in tryptically inactive pancreatic juice, the latter became activated. The same result was obtained if the bacteria were removed by means of a Berkefeld filter, and the filtrate used; this filtrate lost its influence after heating to 100° C. It would thus appear that these bacteria are capable of secreting a kinasic ferment without the intervention of the

cells of the mucous membrane of the bowel. The importance of this discovery can hardly be exaggerated.

Fleig (*Journ. de physiol. et de path. génér.*, 1904, T. VI., p. 32) points out that soap solution introduced into the stomach stimulates pancreatic secretion, but not if introduced into the rectum. If duodenal mucous membrane is macerated in soap solution, an intravenous injection of the macerate stimulates pancreatic secretion. The active material in this case is not secretin, which may be formed by macerating intestinal mucous membrane with acid ; the soap macerate treated with calcium chloride loses its activity, whereas the acid macerate retains it in the presence of the salt. After the complete removal of secretin from intestinal mucous membrane an active substance, extractable with soap solution, still remains. Fleig calls this substance " sapocrinin," and its precursor "crinogenous substance"; by analogy he would prefer to call secretin " Oxycrinin." Sapocrinin does not appear to behave like ordinary ferments, for it is not destroyed by boiling, is soluble in alcohol, is destroyed by oxidising agents, and dialyses but little. Different species of animals appear to secrete the same saprocrinin. If injected into the portal vein, it almost entirely loses its activity, the liver apparently destroying it. The pancreatic juice excited by sapocrinin does not digest albumen or egg albumen until activated by enterokinase.

In following these accounts of recent investigations, the reader is struck by the probable changes that will take place in the study of medicine ; an intimate knowledge will be required of the study of unorganised ferments. The study of animal and vegetable cells is greatly broadened by these and other investigations on their physiology, and it would appear that bacteria which have so long held the field as agents exerting a beneficial or harmful influence on the economy of the body must share this position with the unorganised ferments derived from secretory-cells independently of mycotic action.

In this way light may be thrown in the near future upon a number of obscure disorders which for want of a better title are described as toxic in origin, though what is the nature of these toxic bodies, and how they are produced, is an entire enigma ; whilst the ravages they produce are amongst the most familiar experiences in pathological study, such as the degeneration of

sensory axones in tabes dorsalis, pernicious anæmia, tetany, diabetes mellitus, and even leucocythæmia, not to mention those nerve degenerations which cannot be ascribed to the influence of lead, arsenic, alcohol, or any other known toxic agent introduced from without.

Starling (*Transact. Path. Soc., London,* 1903, Vol. LIV., p. 253) calls attention to various pathological conditions which may in the future be traced to disturbances of the relationship normally existing between pancreatic and intestinal functions, *e.g.,* it has long been an unanswered problem why cases of acute pancreatitis arise. Opie has found that bile, injected into the pancreatic duct, produces acute pancreatitis ; but mere admixture of bile with pancreatic juice has been found by Starling to be quite incapable of producing any corrosive or digestive action in the gland cells of the pancreas, though he admits that, in the experiments, the introduction of enterokinase into the pancreatic duct, which was subsequently ligatured, failed to produce definite results, possibly due to the omission to ligate all the pancreatic ducts. If from any reason a large amount of secretin gains access to the circulation, much pancreatic juice is formed, and enters the duodenum in a strongly alkaline condition, so that if then there is but a small amount of acid in the chyme secreted by the stomach, the excess of unneutralised alkaline pancreatic fluid, after being rendered tryptically active by enterokinase, is capable of exerting a marked digestive action upon the mucous membrane of the bowel, producing erosions of its surface and hæmorrhages into its substance.

An attempt has been made by Lorrand (*Fortschr. der Med.,* 1904, No. 14, s. 616) to prove that the thyroid gland discharges into the circulation a poison which normally is neutralised by the internal secretion of the Islands of Langerhans of the pancreas. Diabetes mellitus in some cases may, therefore, result from hyperfunction of the thyroid gland or from deficient action of the Islands of Langerhans. This theory provides an explanation of the observation that the glycosuria produced by removal of the pancreas may disappear after the removal of the thyroid gland, and Lorrand states that he has treated with success twelve cases of severe Diabetes mellitus by the use of the serum or milk of thyroidectomised animals.

III. *Testicle.*—Many observations have been made to endeavour to establish a relationship between various secretory organs of the body dependent upon the influence of an internal secretion. Cecca and Zappi (*Epitome Brit. Med. Jour.,* 1904, Vol. II., No. 16) castrated or vasectomised six different individual rabbits chosen from six pairs. All the animals were killed after three months, and comparisons were made between the conditions of the various glands of the mutilated animals as compared with the normal member of each pair: a gain of weight took place in most of the castrated animals, the thyroid gland was found enlarged and the vesicles contained more colloid : the suprarenals also showed an increase of the medullary substance. No changes were found in the parathyroids, thymus, or pituitary body.

The ¦acquirement of secondary male characters has been attributed by some authorities to the discharge of sperm, metabolic changes being set up by a nervous reflex arising from the mere functional activity of the sexual mechanism. This theory appears to be negatived by the observations of Shattock and Seligmann (*Proceedings Roy. Soc.,* Vol. LXXIII., No. 488, p. 49), who find that occlusion of the vasa deferentia in the young of Herdwick sheep and of the fowl does not inhibit the full acquirement of secondary sexual characters. More probably there is an internal secretion of the testicle and spermatogenesis may at most be merely an initial factor in the changes known as the assumption of secondary male characters. Possibly certain of the cells of the tubuli, *e.g.,* the "sustentacular" cells, may contain a sort of prosecretin, which is converted into a secretin by chemical changes accompanying spermatogenesis. It is also possible that the so-called " interstitial " cells of the stroma may take part in the formation of such internal secretion. Wallace (*Transactions Path. Soc. Lond.,* 1904, Oct. 8) confirmed by experiments in dogs that even double vasectomy produced no wasting of the testicles nor atrophy of the prostate. Clinical observations and conclusions were not clear in the case of double castration for enlargement of the prostate, but double vasectomy was quite valueless, atrophy of the testicle, which might follow, being due rather to local thrombosis accidentally associated with or dependent on the vasectomy. Unilateral vasectomy produced no unilateral shrinkage of the prostate.

IV. *Pituitary Body.*—The exact nature of the dependence of acromegaly upon disturbance of the pituitary body is still undetermined. Benda and Tamburini consider that acromegaly is due to excessive function of the pituitary body, whereas Cagnetto (*Virchow's Archiv*, 1904, Bd. 176, Heft. 1, S. 115) supports the views of Strümpell, Vassale and Arnold, who believe that both the acromegalic developments and morbid changes in the pituitary body are due to some unknown metabolic disturbance. This view is supported by the knowledge that acromegaly may occur without apparent involvement of the pituitary body, and Cagnetto describes the case of a girl in whom a telangiectic sarcoma involved the pituitary body, and yet signs of acromegaly were absent. The fact that chromophilic cells were absent in the part of the pituitary body, left uninvolved by the tumour, serves as an argument against the views of certain French observers, who think that acromegaly is really due to a diminished function of the hypophysis cerebri. Further, Friedmann and Maas have shown that removal of the pituitary body is not followed by disturbances in the growth of the limbs. Cagnetto also studied microscopically the thyroid gland of his case, but was unable to confirm the views of Rogowitsch and others, that when the pituitary body is damaged, compensatory changes occur in the thyroid gland. In the case of a man who suffered from acromegaly associated with tumour of the pituitary body, Cagnetto found the tumour to be malignant adenoma. In another case of sarcoma of the pituitary body, Rosenhaupt points out that there were no signs of acromegaly (*Berlin. klin. Wochenschr.*, 1903, s. 893). These contradictions require further study. Other factors must be at work or possibly our knowledge of the functional value of the anterior and posterior lobes of the pituitary body is in as much confusion as that on the functional relationship of the parathyroids and thyroids.

Some new light is thrown upon the question by Narbut (*Inaug. Dissert., St. Petersburg*, 1903), who has come to the following conclusions as a result of numerous experiments. There is no doubt that the pituitary body performs definite functions, and these are of far greater importance to the young developing animal than to the adult. Total removal of the organ causes death of a young animal ; but an adult animal can

resist the loss much more, possibly owing to the vicarious action of the thyroid gland ! Loss of weight is a common feature after removal of the pituitary body in young animals, and is greater the younger the animal. Narbut was unable to demonstrate any connection by means of conducting fibres between the pituitary body and the central nervous system, the nervous elements of the body forming an independent system, and he concludes by expressing the view that infantilism is dependent upon an early disturbance of the function of the organ. Cestan and Halberstadt (*Revue Neurologique*, 1903, p. 1180) have approached the study of the influence of age upon the results occurring from disturbed pituitary function. They describe two distinct groups of symptoms, one in which there are psychical changes — mental torpor, somnolence, and loss of memory, whereas in the other the alterations are more physical ones, producing gigantism in some cases and in extreme ones acromegaly. The mental symptoms are apt to occur at any period in life in which there is disturbance of the pituitary gland, but gigantism is mostly restricted to infant life, and acromegaly to the young adult period. In middle and adult ages mental symptoms alone are developed.

(To be continued.)

A REVIEW OF RECENT WORK IN OBSTETRICS: ACCOUCHEMENT FORCÉ AND VAGINAL CÆSAREAN SECTION.

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THE majority of recent contributions to the literature of midwifery deal with modern experiments—it would hardly be safe to say improvements—in obstetric surgery. At the present time the most interesting work of this kind relates to interference during the first stage of labour. Methods of hastening the dilatation of the cervix, or of opening it, in the absence of natural dilatation, and ways of gaining access to the uterine cavity without dilating the cervix at all—these are claiming the attention of all who practise the obstetric art.

The means of giving assistance to parturient women, during the second stage of labour, have been very fully elaborated. Thus the indications for turning and the best methods of performing version, in various circumstances, have been carefully laid down and generally accepted. The construction of the forceps, the manipulation of the instrument, and the indications for its use are well understood, and—a sign of finality— are taught with but slight variations in all schools of obstetrics. This cannot be said of the methods of dealing with the woman whose parturient canal is not fully opened up, but whose condition demands delivery within a definite time.

These methods form the subject matter of an enormous number of recent papers. We may be said to be in the midst of a revival of *accouchement forcé* caused by the supply of some new and improved methods of emptying the uterus *per vias naturales*. It is admitted that, in trade, a supply often creates a demand for the article supplied, and it may be argued that the popularisation of Bossi's dilator has caused many to adopt a policy of active interference with the cervix —has in fact created that *universaldilatationsfähigkeit,* as the Germans call it, which is characteristic of the obstetrics of the moment.

But there is also truth in the more old-fashioned maxim that demand creates supply, and we can see indications that there is a real demand for improved methods of gaining access to the cavity of the pregnant uterus.

For example, the indications for Cæsarean section have been gradually extended until they now include many conditions quite apart from mechanical obstruction of the pelvis. Thus Zinke (*American Journal of Obstetrics*, Vol. XLVIII., No. 311) tabulates 82 Cæsarean sections, reported by 52 different authors, of which at least 20 were done for eclampsia, placenta prævia, cancer of the cervix, threatened rupture of the uterus, accidental hæmorrhage, and other conditions which would not have demanded laparotomy had the operators been possessed of any safe and rapid method of emptying the uterus *per vias naturales*.

In fact the free use of Cæsarean section shows that there is a demand for a good and safe method of *accouchement forcé*. This demand has also been increased by the extension of the so-called medical indications for the interruption of pregnancy, until these include practically every condition of any gravity which is caused or aggravated by pregnancy.

That learned writer Whitridge Williams says (*American Gynæcology*, July, 1903) :—

"Rapid manual dilatation of the cervix, followed by version and extraction in cases of placenta prævia and eclampsia, was first introduced by Jacques Guillemeau and Louise Bourgeoise in the early part of the seventeenth century, and soon became a routine procedure. It is likewise interesting to remember that the former, who was a pupil of Ambroise Paré, had been able by its means to save his master's daughter from perishing from hæmorrhage following placenta prævia ; and that Mauriceau attributed the death of his sister from the same condition to the fact that no one could be found in Paris willing to undertake the necessary operation." . . . .

"Prior to the middle of the eighteenth century *accouchement forcé* was performed very crudely, being brought about by the forcible introduction of the hand through the cervix, which no doubt often led directly to the death of the patient from hæmorrhage or infection. In 1747, however, Puzos advocated the employment of less radical measures, and recom-

mended that the cervix be only gradually dilated in order to permit the contractility of the uterus to come into play, and thus aid the process of dilatation." . . . .

"In the hands of the early obstetricians, as the results of crude methods and an absolute lack of aseptic technique, the operation was attended by so great a mortality that it gradually fell into deserved disrepute. But with the perfection of aseptic technique, and the adoption of more conservative means of bringing about the dilatation of the cervix, the results following it have markedly improved, so that at the present time many hundreds of women owe their lives to its employment. The main indications for its performance are (*a*) eclampsia, (*b*) profound toxæmia, (*c*) accidental hæmorrhage, (*d*) placenta prævia, and (*e*) cases which have fallen into labour spontaneously, but in which symptoms indicative of danger to the mother or child supervene before the cervix has become fully dilated."

Whitridge Williams (*American Gynæcology*, Vol. III., No. 1) names chronologically the available methods of gaining access to the uterine cavity as follows :—

1. Dilatation of the cervix by the hand in form of a cone.
2. Mechanical devices invented by Osiander, Busch, and others.
3. Champetier de Ribes's balloon (and other bags).
4. Deep cervical incisions {Multiple incisions. {Vaginal Cæsarean section.
5. Bossi's and other dilators.
6. Harris' method of manual dilatation.
7. Bimanual methods of dilatation as recommended by Edgar and Bonnaire.

This writer condemns at once (1) the conical hand, (2) the early metallic dilators, (4) Dührssen's incisions, and (7) the various bimanual manœuvres as far inferior to the other methods mentioned. Those he considers practically of value are (3) Champetier de Ribes's bag, (5) Bossi's dilator, and (6) Harris's method of manual dilatation.

He considers that, when immediate delivery is not urgently needed, Champetier's bag, which is now too well known to require description, affords the very best means of securing dilatation.

When immediate delivery is imperative he allows that this method is not quick enough. He regards the general employment of Bossi dilators with disfavour, and himself employs the manual method known as that of Harris. "As soon as one finger can be passed through the internal os, the thumb is gradually forced up alongside of it and moved over it with very much the same motion as snapping one's fingers. Then two fingers and the thumb, three fingers and the thumb, and finally four fingers and the thumb are introduced, the back of the thumb being used as the dilating force throughout each manœuvre."

This method was doubtless used by many before Harris thought it worth while to attach his name to it. The obvious objections to it are—(1) that it is more difficult to sterilise the hand than an instrument; (2) that the work is excessively painful and fatiguing to the hand; (3) that it often tears the cervix; (4) that it cannot be begun until a finger and thumb can be got into the cervix; (5) that it is too slow for some cases; while (6) in other cases it fails altogether. It is, however, perhaps the most generally useful of all the methods enumerated by Whitridge Williams, who reports 89 cases illustrating its use. He says that in many of them, in which the resistance was offered merely by the external os, only three to five minutes were required for dilatation, while the most resistant cervix could usually be completely dilated in half an hour. He considers that Harris' method is even more rapid than Bossi's.

His 87 cases were:—Eclampsia, 30; toxæmia of pregnancy, 13; placenta prævia, 10; hastening labour, 34. There were various deaths from the conditions indicating operation, and three deaths directly attributable to the operation. One of these was due to infection and two to incomplete rupture of the uterus. There were seven other cases in which deep lacerations of the cervix required suture for the control of hæmorrhage. These results show that, like other methods, manual dilatation is attended by certain risks. The writer advises that the process be conducted slowly, 30 minutes being suggested as a suitable time in most cases.

Many would consider this too slow for life-saving purposes in grave cases, and would argue that the risk of tearing during

rapid dilatation is a good reason for the employment of incisions when rapidity is required.

However, this paper by Williams pictures in the most favourable light rapid dilatation of the cervix by the unaided human hand, and, like all the work of this writer, it demands careful consideration. It is also necessary to review the claims of the methods which are said by their advocates to entirely supersede manual dilatation in ease, safety, and rapidity.

One direction in which experiment has recently been very active is the use of metallic mechanical dilators of the Bossi type. Everyone knows, by this time, that Leopold, in 1901, expressed a hope that one of these instruments might soon find a place in the midwifery bag of every medical practitioner. He supported the five claims made for the dilator by Bossi and others, namely :—(1) It can be used even when the cervix is closed and unshortened, that is before dilatation has begun ; (2) the operator is sure of obtaining sufficient dilatation to allow of the delivery of a living child ; (3) this can be secured, if necessary, in a short time—10 to 15 minutes ; (4) the use of the instrument excites uterine action ; (5) dilatation up to 11 c.m. (4$\frac{1}{3}$ inches) can be secured without unduly stretching the vagina.

Now any instrument, which will answer the above requirements, would provide a formidable rival to Dührssen's methods, vaginal section, and multiple incisions, and a long wordy war has been raging between Dührssen and Bossi. It is pointed out that the dilator does not always enable the operator to secure enough dilatation for the delivery of a living child, and that the operator has but imperfect control over the process. Further, the method is positively dangerous, as it is always liable to cause serious tears, which may bleed and may also become infected with disastrous results.

The literature of this subject of rapid mechanical dilatation of the cervix in obstetrics has recently been reviewed by the present reviewer (*Journ. Obstet. and Gyn. Brit. Emp.*, October, 1904), and, indeed, papers on Bossi's dilator are so common that it is unnecessary to say much about it or its modifications in this place. Attention, however, may be called to a new instrument designed by De Seigneux (*Journ. Obstet. and Gyn. Brit. Emp.*, 1904, Vol. VI., No. 3).

This writer holds that all previous instruments are (1) without true pelvic curve ; (2) that they are too heavy and complicated ; and (3) that the dilating surface is too small. The plane in which the points of the blades move ought to be parallel with the plane of the brim if the blades are to act evenly and truly on the walls of the cervix, whose axis is approximately perpendicular to the plane of the brim. With all instruments of the Bossi type it is impossible to bring the axis of the instrument to lie in the axis of the pelvis, and to this fact is due the explanation of the majority of the tears produced in dilating with these tools. De Seigneux has devised a simple instrument on a different principle altogether. It possesses a true pelvic curve, and will probably survive in the struggle for existence with other instruments.

Reports of cases in which it has been used are already appearing, and it would appear to be, as De Seigneux claims, a genuine advance upon other instruments devised for the same purpose. Quite recently another very important paper on mechanical dilatation has appeared (*Archiv für Gyn.,* 1904, Bd. LXXIII., Heft 3). In this paper Erlich records 30 new cases, and refers to no less than 70 original articles on the subject. In his own cases, eclampsia affords the most frequent indication for mechanical dilatation. As six out of 19 cases were lost, the results cannot be regarded as brilliant. Other reasons for its employment were fever during labour, rigidity of the cervix, phthisis, anything which prevents natural dilatation by the presenting part of the bag of waters, and lastly, threatening of the child's life by compression of the cord. This writer has not as yet dilated with instruments for placenta prævia or accidental hæmorrhage, nor has he used them as the primary stage in the induction of premature labour.

Erlich considers that rapid mechanical dilatation should be employed only when the life of the mother or that of the child is seriously threatened. The earlier the stage of pregnancy the greater is the care necessary, and the greater is the risk of injuring the cervix. Extra precaution is also necessary in primparæ, and in all cases in which the cervix is not taken up. In fact the multipara at term whose cervix is already and considerably dilated would appear to be the only type in which rapid dilatation is easy and free from risk. This author gives a

full description of the different classes of tears and lacerations which have been reported during the use of dilators of the Bossi type, and gives elaborate instructions as to their avoidance and their treatment by suture and packing.

The other method of emptying the uterus which is attracting the attention of obstetric surgeons is the so-called vaginal Cæsarean section, which, if not invented by Dührssen, was at least brought into notice by him (*Allgemeine Deutsche Aerzte-zeitung*, 1895, No. 7, 8). The operation depends upon the fact that when an incision has been made in the anterior fornix of the vagina, the bladder can be readily separated from the pregnant uterus and pushed up exposing the anterior uterine wall. If this be done, it is then possible to cut through the cervix in the middle line and to extend the incision upwards through the anterior wall of the lower uterine segment until free access to the uterine cavity is obtained without cutting through the peritoneum into the abdominal cavity. If necessary the opening can be enlarged by dividing the cervix in the middle line posteriorly. By this method it is possible to empty the uterus in 6 or 8 minutes. The incisions are thereafter closed by sutures. In beginning the operation it is sometimes necessary to make one or more deep incisions in the perineum in order to gain access to the cervix.

It is necessary to distinguish this operation from another measure which has been long in use, and which has also been freely advocated by Dührssen. This is the use of multiple incisions in the cervix. Where there is partial dilatation, and it is necessary to deliver without further loss of time, it is sometimes impossible to complete dilatation without tearing the cervix. Under these conditions five or six incisions made into the cervix give access to the uterus more rapidly than any other way. If made deep enough and numerous enough, they will not be extended by tearing during delivery. They can be stitched conveniently as soon as delivery is complete in order to check bleeding and secure primary union.

Dührssen considers that his operation is superior to any form of dilatation, because it gives complete access to the uterine cavity, and therefore is not followed by tearing during delivery. He considers that it should have no mortality. His "conservative operation" consists in emptying the uterus

as above described, and his "radical operation" implies the same procedure followed by vaginal hysterectomy. In all cases of cancer of the cervix, Dührssen advises that this measure be carried out without delay, whatever stage pregnancy may have reached when the existence of cancer is discovered.

Vaginal Cæsarean section, the writer mentions in a recent paper, has already been done over one hundred times, and has proved to be a comparatively safe operation. He advises incising the posterior as well as the anterior uterine wall in delivery at term. The perineum must also be incised if the vaginal portion of the parturient canal is too small.

He considers the "conservative" operation indicated "where a closed and undilatable cervix endangers the life of the mother, and, in rare cases, that of the child."

The indications for vaginal Cæsarean section may, therefore, be stated as follows :—

A. In cancer of the cervix during pregnancy, the operation being followed by vaginal hysterectomy.

B.—1. Abnormal conditions of the cervix and lower uterine segment (rigidity, fibroma, stenosis incarceration).

2. Dangerous states of the mother removed or relieved by prompt emptying of the uterus (heart, lung, and renal affections).

3. Cases where death of the mother is imminent and can be foreseen.

This operation, it is clear, is intended to replace classical Cæsarean section in eclampsia and all conditions where the soft parts obstruct labour seriously.

Dührssen operated on a number of cases, and published a monograph on the subject in 1896, but only recently has the operation attracted general attention.

Simon (*Münchener med. Woch.*, No. 21, 1903) has described three cases. In the first the indication was cicatricial stenosis of the os following amputation of the cervix and narrowing of the vagina by anterior and posterior colporrphy. The perineum and posterior vaginal wall were incised, and the anterior vaginal fornix was opened by a transverse incision. The bladder was pushed up as in vaginal hysterectomy, and the anterior wall of the uterus was cut upwards in the middle

line for a distance of 10 centimetres. The child having been delivered by forceps, the uterine incision was closed with 10 deep silk sutures. The wounds in the vagina and uterus were closed, and the patient recovered without any return of prolapse.

Simon's second case was an elderly primipara, whose cervix gradually dilated to admit two fingers. The pains continued, and fever and exhaustion followed with no further dilatation. The anterior wall of the cervix and lower uterine segment were opened in the median line, and a child, which lived, was delivered. The mother died three days later.

His third case was one of eclampsia, and vaginal section was done after dilatation with bags had been attempted without success. The fœtal head was perforated to assist delivery, and the mother recovered.

Ruhl (*Centralblatt für Gyn.*, No. 47, 1901, and No. 34, 1903) performed vaginal section in a severe case of premature separation of the normally situated placenta (accidental hæmorrhage). The os admitted one finger, and a bag was introduced; but further signs of concealed hæmorrhage occurred and the operation was done after infusions of normal saline solution. The posterior and anterior uterine walls were incised and the child was delivered within 6 minutes : the patient recovered.

This author's next case was one of rigidity of the cervix. Labour had lasted five days after the rupture of the membranes. The retraction ring was plainly felt three fingers below the umbilicus. The vagina was " infantile," and the pelvis was narrow. An unsuccessful attempt was made to dilate with instruments, and an anterior incision was then made in the cervix and lower uterine segment. A living child was delivered with forceps. The vagina was badly torn, the perineal tear extended into the rectum, and from the highest point in the anterior incision a tear extended across the lower uterine segment into the parametric tissue. The tears were all closed by sutures, and the patient recovered. Ruhl remarks that ordinary Cæsarean section is an easier operation than the vaginal incision for one not experienced in vaginal surgery.

Bumm has reported several cases (*Centralblatt für Gyn.*, No. 53, 1902). There was cancer of the uterus in two cases.

eclampsia in five, two of nephritis, one of chorea, and one of hæmorrhage. One of the eclamptic cases died.

Dührssen (*Centralblatt für Gyn.*, No. 16, 1903) describes another case of eclampsia in which the cervix would only admit one finger. He incised the vagina on the right side, and made anterior and posterior cuts in the cervix, a living child was delivered by turning.

A case of eclampsia at the sixth month was operated on by Westphal with success (*Centralblatt für Gyn.*, 1903, No. 46).

Dührssen further (*Centralblatt für Gyn.*, 1904, No. 13) records a case of placenta prævia at the fifth month in a multipara. Dilatation by means of a tent having failed, the cervix was drawn down by two ligatures and a median incision was made through the anterior wall of the vagina and cervix. The bladder in this case was neither seen nor pushed up. The fœtus and a prævial placenta were removed, and the uterine cavity was plugged with gauze to control the hæmorrhage. The incision was sutured with catgut, and the vagina was also packed with gauze. The patient made a good recovery.

Stamm (*American Journal of Obstetrics*, November, 1903) has twice performed the operation for eclampsia. In a multipara, whose cervix admitted a finger-tip, instrumental dilatation was commenced, but was thought to be too slow, and, although the patient was in a private house, vaginal section was done, a large posterior and a smaller anterior incision being made. The child was delivered by turning in 6 minutes, and the incisions were united with catgut within 25 minutes after the commencement of the operation. The patient made a good recovery.

In a primipara with eclampsia at the eighth month the cervix admitted two fingers. She was left at home for the night, conveyed to hospital in the morning and delivered by vaginal section, anterior and posterior incisions being used. In this case rapidity was apparently of no great importance, and a more obstetric method, which could have been employed by artificial light in the patient's home, might have had a better result than section in the morning, for the child was lost, although the mother recovered.

Munro Kerr published an interesting account of the subject

last March (*Journ. Obstet. and Gn. Brit. Emp.*, VoL V., No. 3). He mentions three new cases. A multipara about five months pregnant · had persistent vomiting. The os was completely closed and very rigid. As the patient's pulse was 160 and very feeble, vaginal section was regarded as the only possible means of emptying the uterus in time to save her life. The uterus was opened and emptied in about 4 minutes. The wound was then stitched, the bladder brought down and tacked into its place, the vagina being lightly packed with gauze.

In another case McLellan operated on a primipara who, after being in labour 36 hours, was considered to require prompt delivery. He stripped off the bladder and incised the cervix up the middle line, delivered the child alive, and experienced no difficulty in suturing the wound. Kerr more recently delivered by this method in a case of eclampsia. The cervix was not in the slightest degree taken up and was very rigid. The vagina was narrow and œdematous, and the operation was difficult. The child was delivered with forceps, but the cervix could not be pulled down and suturing was not at all easy. There was a small laceration of the neck of the bladder. Munro Kerr considers that vaginal Cæsarean section has some distinct claims. The first is that it is in some cases the only way of emptying the uterus quickly (short of classical Cæsarean section). There are rare cases in which the cervix is so rigid that it will not dilate, and will only tear if sufficient force is applied by mechanical dilators. Next, in other cases, dilatation by other means would require at least half an hour, whereas by vaginal section the uterus can be emptied in 4 or 5 minutes. A third advantage claimed is absence of shock, and fourthly, it is said that a clean cut is preferable to a tear, and that tears cannot be avoided in rapid mechanical dilatation.

Before attempting a restatement of the relative positions of the methods of interrupting pregnancy, it is necessary to make brief mention of the present position of induction of labour. That this is not superfluous is shown by the loose way in which some writers use this term. Thus Higgins, writing in the *Journal of the American Medical Association* (November 19,

1904), says :—"Other forms of induction of labour worthy
of serious consideration are those by which the results are
accomplished by forcible dilatation of the cervix either by
the hand or by instruments " (*sic*). These of course are not
induction of labour at all. The distinction must be clearly
preserved between inducing or bringing on natural labour,
and replacing natural labour by an artificial process in which
the patient is passive throughout. The fact that various instru-
ments may be used for both purposes, namely, for induction of
labour and for *accouchement forcé,* should not cause mental
confusion between the two operations.

The majority of writers have not used dilators of the Bossi
types as a method of inducing labour, though many have used
them for completing dilatation in cases of labour artificially in-
duced by other means. Heller, however, has recently published a
record of the use of mechanical dilators for this purpose (*Archiv
für Gyn.,* 1904, Bd. LXXIII., H. 3). He considers that bougies
are slow, are liable to injure the placenta, and easily admit of
infection of the uterus. He, therefore, prefers to set up labour
pains by the introduction of bags. The main difficulty in getting
the bag within the cervix consists in securing preliminary dilata-
tion. This he has done in 30 cases by means of modern dilators.
In seven cases De Seigneux's instrument was employed, and
was found to be superior to those of the Bossi type, as in no
case did it injure the cervix. In some of the other cases lacera-
tions were observed. After introducing the bag by this method
pains followed rapidly as a rule ; the bag being expelled in one
case in 2 hours 40 minutes. The average duration of dilatation
by the bag was 9 hours. The average duration of the whole
labour in the 30 cases was 11 hours 30 minutes. There was
no mortality, and no patient remained in hospital more than
16 days. Heller considers this a great improvement in the
technique of induced labour. He mentions Buschleick's esti-
mate of the average duration of induced labour, namely, 79
hours, and Schödel's, which was 41 hours. No doubt Heller's
average of 11½ hours is better than anything that can be
obtained by the insertion of bougies, but he should have com-
pared his results, not with this, but with the introduction of
bags by other methods. Many years ago, for instance, the

present reviewer published a series of cases of induced labour, in which the process was begun with Hegar's dilators under anæsthesia, a Champetier de Ribes's bag being introduced as soon as No. 18 Hegar had been passed. The average duration of labour in these cases was about 11 hours, and there is no reason to believe that, for the purpose of introducing a bag, modern expanding dilators are any more efficient or safe than the old-fashioned instruments of Hegar.

One other point must be cleared up. Many writers seem to consider the use of non-elastic bags of the Champetier de Ribes's type to be one of the methods of performing *accouchement forcé*. It must be remembered that these instruments were originally devised for the induction of premature labour. The conical non-elastic bag was intended to act in two ways— (1) to replace the bag of waters or presenting part ; and (2) to set up uterine contractions (labour pains) by its presence in the lower uterine segment, cervix, and vagina. It was only later that the uterine action was reinforced when using this instrument, by pulling on the stalk of the bag. So employed, the use of the bag was extended to a sort of cross between induction of labour and *accouchement forcé*, very useful in placenta prævia and accidental hæmorrhage. There is no objection to this ; but, for the sake of clearness in thought, it is well to classify Champetier de Ribes's bag and all its modifications as, in the first place, means of calling forth uterine action— the quickest and best means of *inducing* labour—and not as instruments for *replacing* labour by *accouchement forcé*.

It is clear that, taking induction of labour at its best, it is a slow process compared with *accouchement forcé*. While the latter demands minutes, the former occupies hours. Thus induction of labour is only available as a method of interrupting pregnancy in cases which present no urgency. With modern technique, however, it is so safe a measure that it will probably continue to be the favourite method of dealing with the slightest cases of hæmorrhage, threatened exlampsia, excessive vomiting in the later months, chorea, jaundice, and other states which may be regarded as sub-acute manifestations of the toxæmias of pregnancy.

But all the cases remain in which it is necessary to empty the uterus artificially, rapidly, and without any muscular

exertion on the part of the patient. The methods available may be stated as :—

(1) Manual dilatation.

(2) Branched metallic dilators.

(3) { Multiple incisions.
{ Vaginal Cæsarean section.

The nature of the indication for terminating pregnancy quickly has no influence upon the choice of the method to be used. This choice must be made with two things before the mind, viz.; the speed with which it is necessary to deliver, and the state of the cervix.

The question may be still further simplified by dismissing the method of multiple incisions into the cervix as desirable only in those rare cases in which dilatation advances to a considerable extent, and then ceases, the tissues being so rigid that attempts at artificial dilatation by hand or instruments cause tearing.

In the majority of cases in which it is necessary to empty the uterus quickly, the cervix will dilate without tearing if sufficient time be devoted to the operation. Great stress has been laid upon the difference between cases in which the cervix is not taken up, and those in which it is already taken up where the need for delivery arises. This is of course an important point, but not quite so important as would appear. For though not dilated the cervix may be easily dilatable, a condition familiar to all practical men. In every case where the cervix will dilate, either the hand, or a dilator of the Bossi type, is available, for if the os will not admit a finger, the necessary amount of room can be gained by the use of Hegar's dilators. Recent reports, however, prove that dilatation by the hand or by metallic instruments demands time if tearing is to be avoided. We now read " half an hour " and " three-quarters of an hour," where in earlier publications we read " 10 minutes " and " 15 minutes."

Thus there would appear to be room for vaginal Cæsarean section amongst those cases which would dilate safely and easily enough were time no object. In those cases where a saving of a few minutes may save the life of a mother or child, the operation would appear to be justified. Its other use is obviously in cases where dilatation is impossible owing to

stenosis of some kind or malignant disease. Vaginal Cæsarean section, in short, will tend to replace classical Cæsarean section, except in cases of mechanical obstruction by bony pelvis or by tumours.

It is clear that both *accouchement forcé* and vaginal Cæsarean section demand a good operator, adequate assistance, and suitable surroundings. All the methods have been employed successfully in private houses, though they are of course more safely and easily managed in hospital. As briefly noticed above, the papers reviewed may appear to advocate the free and frequent use of *accouchement forcé*, but read in detail they show that no one, without good training and experience, should attempt either operation.

Apart from the direct object of these papers, it is to be hoped that they will have at least one practical result. It is notorious that, in spite of the teaching of the schools, the forceps is often applied through an incompletely dilated cervix, and delivery is often attempted and carried out before dilatation is complete. Also, when turning has been done before the cervix is fully open, the temptation to deliver is often too strong, and the child is pulled, head last, through an undilated canal. The disastrous results of the laceration and dislocation of the pelvic floor so caused are only discovered at a later date. The recent papers on dilatation and *accouchement forcé* paint these occurrences—they are not accidents—in such lurid colours that it seems probable that the whole profession will at last realise that delivery must not be attempted until dilatation is complete. The forceps is an instrument for ending the *second* stage of labour, and not for use before the completion of the first. Delivery of the body and aftercoming head is a thing separate and distinct from version. Turning may be done at any time during labour ; delivery after turning must not be done until the first stage is over. In short, it is an atrocious blunder to end the second stage of labour before either nature or art has ended the first.

FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

II.—KING'S COLLEGE HOSPITAL.

[With Plates XXVI.—XXIX.]

IT is said that, when a few years ago an American visited London for the first time, he was asked what he thought of it ; the reply was : " Waal, I guess it will be a fine city when it is finished." That American to-day might be pardoned if he expressed surprise at the tardiness with which the process of completion proceeds. Forty years ago, on passing through Temple Bar from the City of London to Westminster, a visitor would find himself in a narrow, inartistic thoroughfare from which courts and alleys led northwards into the densely populated slums which lay between the Strand and Lincoln's Inn Fields. A little further on he would plunge into a narrow street, devoted to the sale of second-hand books and other things of a less edifying character, which bore the name of Holywell Row, or, if he turned a little to the right, he would find himself in the still more questionable locality of Wych Street. These places are now happily no more, and the slum neighbourhood, lying between the Royal College of Surgeons and the Strand, in the midst of which King's College Hospital stood, has been almost entirely swept away. Facing the Strand now stands the noble pile of buildings, the Royal Courts of Justice, designed by the eminent architect, Geo. Edmund Street, and, farther west, are vacant spaces to be filled by suitable buildings under the watchful eye of the London County Council. Perhaps after the lapse of another generation our American may be able to express admiration of some part of London which has been worthily completed.

Unlike some of the other hospitals in London, King's has only a modern history, and, from what has been said above, it will be gathered that the services rendered by it to a population of something like 400,000 souls, are no longer so much needed in this part of London. Still, it has a noble record,

and the advancement that medical science has made within its walls will ever be remembered with gratitude.

King's College, which gave its name and fostering care to the Hospital, was opened in October 1831, and contained three distinct departments of education : (1) General Literature and Science, (2) the Medical Department, (3) the School ; but it soon became evident that the second could not be thoroughly and efficiently worked without a hospital in the immediate neighbourhood for the purpose of securing the advantages of clinical teaching.

The matter received the attention of the Council of the College, who came to the following duly recorded conclusion : —"Finding that hospital practice in connection with and in the vicinity of the said College was indispensable for the complete medical education of its medical students, did in the year 1839 take measures for the formation, in the parish of St. Clement Danes, in the County of Middlesex, of a public hospital for the relief of poor, sick, and infirm persons, to be supported by voluntary contributions, and to which the students of medicine and surgery belonging to the said College might, under proper regulations, for ever have access."

Fig 1. *King's College Hospital in* 1839.

The outcome of this resolution was that King's College Hospital was opened in the year 1839 on the site of the old St. Clement Danes Workhouse in Portugal Street, Lincoln's Inn Fields, and, for a considerable period, served the purpose for which it was intended. A glance at a representation of the building (Fig. 1) will serve to show that it could not meet satisfactorily the demands that were likely to be made

PLATE XXVI.

Fig. 2. *The building as originally designed in* 1850, *only part of which was completed.*

Fig. 3. *The Hospital when completed and as it now stands.*

PLATE XXVII.

Fig. 4. *The Great Hall.*

upon it. It contained only 120 beds, and, from its position in one of the poorest and most densely populated districts of London, to the utmost of its power, afforded relief to those who were suffering from the most varied types of disease.

The first members of the hospital staff were : Surgeons—Richard Partridge and William Fergusson. Physicians—Robert Bentley Todd, M.D., and George Budd, M.D., with Robert Ferguson, M.D., for diseases of women and children. Assistant Surgeons—William Bowman and John Simon. Surgeon dentist—John Tomes. The first house-surgeon was Henry Lee, and the first house-physician Henry Elton.

In August 1851 an Act of Parliament was obtained by which the hospital was incorporated with King's College, and by the terms of which the Council of King's College have the control of the hospital together with the right of appointing and removing all medical officers, the chaplain, the clinical clerks, and dressers. The Act also secures that the medical students of King's College shall have, under proper regulations, free access to the wards and operating rooms of the hospital, for the purpose of receiving therein clinical instruction and pursuing the course of study prescribed by the Council.

Five architects having been invited in 1850 to compete in preparing suitable designs for the new building, that prepared by a Mr. Thomas Bellamy was selected as being the best, and Mr. Bellamy was accordingly appointed architect to the new hospital. The building as originally designed by Mr. Bellamy (Fig. 2) was never completed, for the west wing is still unbuilt. The foundation stone of the new hospital was laid on the 17th of June 1850 by the Archbishop of Canterbury in the unavoidable absence of the Earl of Ellesmere, who was the President of the Hospital. The erection of the first part of the building was then proceeded with as rapidly as circumstances permitted. This part included the Out-patients' Department, the Chapel, the Operating Theatre, the Post-mortem Theatre, together with wards capable of containing 91 beds, each ward measuring 70 feet by 24 and holding 13 beds, also the necessary accommodation for medical officers, dispensers, nurses and servants. Owing to various causes, one of which was a strike, the contract, which should have been completed in September 1853, was not actually finished until February 1855, when the

various parts of the building were brought into full use. The second and largest portion of the new hospital was completed in 1861, and this had the effect of removing entirely the remains of the old St. Clement Danes Workhouse, which had been extemporised into a hospital, and which had been so used since 1839. For an illustration of the building, as then completed and as it now exists, *see* Fig. 3. The time taken for the completion of the hospital was about ten years, and it occupied the site of the old Institution and the burial ground adjacent to it. The actual cost was something over 65,000*l*. The main entrance of the hospital is in Portugal Street, so called in memory of Catherine of Portugal, Queen of Charles II.

On the ground floor are the Casualty and Out-patients' departments, the sitting-rooms of the resident officers, the Offices, the Board Room, and the Fisk Ward. In the Board Room will be found portraits of many eminent men who have rendered such valuable service to the Hospital, and also a very interesting copy, by James Yates Carrington, of a celebrated picture which was exhibited in the Academy in 1888. This replica shows three dogs at the door of the Hospital, two fox terriers and a large dark collie. It is said that at 9 o'clock in the morning of Sunday, July 31st, 1887, these two terriers, who had had some experience of the benefits of the Hospital, brought a casualty case in the shape of the collie, whose right leg was damaged and bleeding, for beneficial treatment. We need hardly say that they were not disappointed, and it is interesting to know that the dogs were identified, and that their portraits appear on the canvas. Close by is the Great Hall, around the sides of which winds the massive stone staircase leading up to the various wards, while on its floor in an excellent position is a life-size marble statue of Dr. R. B. Todd, one of the earliest physicians to the Hospital (Fig. 4). On the east wall of the hall is a tombstone removed from the graveyard over which a portion of the Hospital was erected. This tombstone perpetuates the memory of a well-known actor at Drury Lane Theatre, Joe Miller, whose book of jests is almost a classic. He died in 1738, and the following verse adorns his tomb :—

> " If humour, wit, and honesty could save
> The humorous, witty, honest from the grave,
> The grave had not so soon this tenant found,
> Whom honesty and wit and humour crowned."

PLATE XXVIII.

Fig. 5. *The Operating Theatre.*

Fig. 6 *The Chapel.*

PLATE XXIX.

Fig. 7. *Pantia Ralli Ward.*

On the first floor are to be found the following wards :—

The Victoria and Albert Wards, the Fergusson Ward, named after Sir William Fergusson, the Wigram Ward, and the Storks Ward. On this floor also is the Operating Theatre (Fig. 5), in which Lord Lister performed the majority of his operations and gave his world-wide famous Lectures on Antiseptic Surgery. Here also is the beautiful little chapel with its dim religious light, which is becoming a memorial chapel by reason of its stained glass windows and memorial tablets (Fig. 6).

On the second floor are to be found the Sambrooke Ward, named after Mr. Sambrooke, by whose munificence medical and surgical registrarships at the Hospital were endowed, and who, by his will in 1871, left £10,000 for the purpose of founding scholarships and exhibitions for deserving students at King's College ; also the Craven Ward, the Twining Ward, called in memory of the Twining family, and the Whiting Ward, so named in memory of the late Matthew Whiting. On this floor are also Ophthalmic Wards and an Operation Theatre.

Ascending to the third floor, we are introduced to the Todd Ward, which by its name perpetuates the memory of Dr. Robert Bentley Todd, whose early death at the age of 51 in 1860 terminated the exceptionally brilliant career of one of the original medical staff of the old Hospital. On the third floor also are King's College Ward, and the Cheere Ward, named after Mr. Robert Cheere, who was Treasurer of the Hospital. To this last-named ward an interesting history is attached. In 1860 it was suggested to the governors of the Hospital that a special ward for the reception of lying-in women should be set apart under the care of Dr. Arthur Farre. The establishment of such a ward would provide sound and practical instruction for nurses and students in obstetrical cases, and afford the best medical skill with proper comforts and careful nursing to poor married women. So in 1861 this, then the Nightingale Ward, was fitted up and opened for use. But after six years' experience, in consequence of the alarming mortality among the patients, in one year as high as 12 per cent., Dr. Priestley recommended that it should be closed. Shortly after this the governors were enabled to reopen this ward, under the name of the Pantia Ralli Ward, for the reception of children (Fig. 7).

The fourth floor, together with the greater portion of the west wing, is occupied by the nursing staff.

In the early years of the Hospital, in 1856, the nursing of the patients was entrusted to a voluntary nursing sisterhood —the Sisterhood of St. John's House, Westminster. This Institution was established for the training of nurses, and the arrangement by which its sisters and nurses became responsible for the care of the patients was an entirely novel one, and was watched with great curiosity not unmixed with anxiety. A certain sum was paid annually to the Sisterhood for the service rendered, and the outcome of the arrangement was undoubtedly a material enhancement of the comfort of the patients, a great improvement in the general internal arrangements of the Hospital, and the promotion of the highly desirable object of training a superior class of persons for the duties of a nurse.

That the Hospital has fulfilled a truly benevolent duty may be gathered from the fact that, during its history, it has received in round figures nearly 120,000 in-patients, while those who have been attended to as out-patients number considerably over one million and a half.

And if the benefits conferred upon the suffering poor of the immediate neighbourhood have been great, those conferred upon the world at large by the labours of the eminent physicians and surgeons to whose care the patients have been entrusted, have been infinitely greater. To mention the names of some of these will at once call up in the minds, not only of old King's men, but also of most practitioners who have followed the history of their profession, feelings of gratitude and respect—Lord Lister, Dr. Robert Bentley Todd, Sir William Bowman, Dr. George Budd, Sir Thomas Watson, Dr. Arthur Farre, Sir George Johnson, Mr. John Wood, Dr. Lionel Beale, Professor Partridge, Sir Wm. Overend Priestley, Sir William Fergusson, and last, but not least, Dr. Jno. Curnow. To some of these we hope to refer specially in a later article, for it was in King's College Hospital that they practised or developed the systems which have rendered their names household words to the medical profession.

Our readers will now be prepared to learn that the days of the present King's College Hospital are numbered. Instead

of being in the centre of a densely populated poor neighbour-
hood, through the clearance of slums, the alleys, courts, and
narrow streets, it now stands, not desolate and alone, but
hemmed in by piles of offices, warehouses, and manufacturing
premises, and soon the vacant spaces near at hand will be
occupied by large and handsome buildings. The decrease in
the number of out-patients bears testimony to the altered
character of the surroundings, while the steady maintenance of
the number of in-patients attests the popularity of the medical
and surgical treatment and the well-deserved reputation of the
staff of the Hospital. Seven years ago a Committee of the
Medical Board reported that, "whatever may have been the
advantages of the present site originally, it must be admitted
that the great improvements that have taken place in the
surroundings of the Hospital render it much less necessary,
from a charitable point of view, than when first founded. The
possibility of removing the Hospital to a site where the clinical
material would be more abundant should therefore be con-
stantly and carefully borne in mind." This report, it need
hardly be said, might to-day be repeated with tenfold emphasis
with a view to immediate action.

Happily the needs of the poor in a district unprovided with
adequate hospital accommodation, the requirements of the
medical students of the College, and the absolute necessity of
providing a building in every way answering to the modern
ideas of hospital construction, have not appealed in vain to the
Governors of the College and Hospital.

It has been decided to erect without delay a suitable
hospital in the South of London, such hospital to serve the
crowded districts of Lambeth, Camberwell, and parts of
Southwark, Bermondsey, and Deptford. But such a scheme
cannot be carried to a successful termination without the
outlay of a vast amount of money. An Act of Parliament
enabling the Corporation to carry out the proposed removal of
the Hospital has been obtained, and a valuable site of 12 acres in
the South of London has been presented by the Hon. W. F. D.
Smith, M.P. It is hoped that the foundation stone of the
new building will soon be laid, and that then King's College
Hospital will enter upon a fresh and more lengthened lease of
life in a new and needy district.

(*To be continued.*)

BY-PATHS OF MEDICINE.

OUR PREMIER MEDICAL SOCIETY.

[With Plates XXX.—XXXI.]

THE Royal Medical and Chirurgical Society of London will celebrate the centenary of its foundation in May. In 1805,when it came into being, the Medical Society of London was the only important body of the kind in existence in the metropolis. There were, indeed, one or two others, such as the Society for the Improvement of Medical and Chirurgical Knowledge and the Lyceum Medicum Londinense. The former was founded in 1783 by John Hunter and Dr. Fordyce, who also were the patrons, if not the true begetters, of the latter. The members of the Society for the Improvement of Medical and Chirurgical Knowledge, like the Muses, originally numbered nine, and it was provided that there should never be more than twelve. The meetings were held at a coffee house, and the papers read were discussed and "corrected" after dinner. The Society published three volumes of *Transactions*, but with the issue of the third its scientific productiveness seems to have been exhausted, and thenceforth it subsided into a dining club. On June 2, 1818, it went, like Hans Breitmann's "barty" "afay in de ewigkeit." Learned and earnest as the Society doubtless was for a time, there was a good deal of human nature in it, for its minute book, now in the possession of the Royal Medical and Chirurgical Society, contains the following entry under the date October 7, 1798 : "There being so much joy and interest of conversation about Sir Horatio Nelson's victory, no business was done at this meeting." That it was a somewhat jealous body, too, may be gathered from the fact that when Dr. Roget was proposed as a member, his name was withdrawn when it was discovered that he had accepted the office of secretary in another society, to wit, our great and glorious Medical and Chirurgical.

The Society, which bore the learned name of "Lyceum Medicum Londinense," was instituted for the advancement of medical knowledge in January 1785, and included students as well as practitioners. The members had to read papers in rotation, and the Society gave medals for dissertations on stated

subjects. The first medal was awarded to Everard Home for a disquisition on the properties of pus. The Lyceum seems to have died of a decline in 1809.

> The earth hath bubbles, as the water has,
> And these are of them.

Unlike these, a fine example of stability is afforded by the Medical Society which still flourishes with unimpaired vitality. It was founded in 1773, mainly by the efforts of Dr. Lettsom, the Quaker physician, whose name is embalmed in a well-known rhyme. Its object was "to give the practitioners of the healing art frequent opportunities of meeting together and conferring with each other concerning any difficult or uncommon cases which may have occurred, or communicating any new discoveries in medicine which have been made either at home or abroad." According to Mr. D'Arcy Power, to whose interesting papers on the Medical Institutions of London, published in the *British Medical Journal* of 1895, we are indebted for information about this and the other two societies already referred to, it was chiefly owing to dissatisfaction with the conduct of the affairs of the Medical Society that the Medical and Chirurgical Society was established. A particular grievance appears to have been the conversion of the office of president into a virtual sovereignty by the uninterrupted re-election of one man, Dr. James Simms, for nearly a quarter of a century. How this "Boss" rule was established and maintained is not very clear, but Dr. Simms evidently held the Society in the hollow of his hand, for in 1800 it paid him a sum of £500 for books, and further agreed to pay an annuity of £30 to his wife in the event of his going before her into the silent land. The Society had a somewhat chequered history, and in the middle of the last century it had fallen on evil days, its membership having in 1850 fallen to 60. It gained new vigour by joining itself with the Westminster Medical Society (founded by Sir C. Mansfield Clarke and Sir Benjamin Brodie), which at that time had 237 members. The process was an absorption rather than a union, for the name of the larger but younger Society disappeared and the President of the Medical Society, Dr. (afterwards Sir Risdon) Bennett, became the first President of the amalgamated body.

The establishment of the Royal Medical and Chirurgical

Society, which, as already said, was an offshoot of the Medical Society, was suggested by Dr. Marcet and Dr. Yelloly. In the preface to the first volume of its *Transactions*, its origin is thus described : "The want of a Society founded upon liberal and independent principles, and conducted with the propriety and dignity which are worthy of the medical profession, had long been acknowledged : and a few Physicians and Surgeons, in the year 1805, held a meeting for the purpose of considering the best means of obviating it. They invited many gentlemen of eminence to join them, and thus a society was formed, which, they soon had the satisfaction to see, comprised a very respectable portion of the professional rank and talent of the metropolis."

The object of the new Society was stated to be the investigation of researches made from time to time in anatomy, physiology, and chemistry as connected with medicine; the examination of the varied forms of disease, whether medical or surgical, and their appropriate treatment ; the consideration of those deviations from healthy structure, and curious facts in the natural history of the human body which occasionally present themselves to notice ; the formation of an extensive library for the use of the members ; and the publication from time to time of the papers read at the meetings of the Society. Familiar discussion was not the least important part of its business, as appears from the following passage of the preface : " The reading of such communications as are presented to the Society forms one part of its ordinary business. The interchange of practical knowledge, in the way of easy conversation, is the other ; and the President and Council have much satisfaction in noticing the important advantages which have resulted and still continue to result, from the opportunities which are afforded, in a meeting of liberal and enlightened professional men, of stating difficulties, imparting observations, or suggesting improvements in practice. In furthering this important object, the union of gentlemen in both branches of the profession affords a greater facility of obtaining accurate information on many points of practice, than could have been derived from a Society composed of either Physicians or Surgeons alone. It may be proper, however, to remark, that it does not at all enter into the plan of this institution, to suffer its proceedings

PLATE XXX.

DR. W. SAUNDERS, F.R.S., F.R.C.P.

PLATE XXXI.

SIR ASTLEY COOPER.

to assume the form of debate or disputation." A leading part in the foundation of the new Society was taken by Astley Cooper, who was its first treasurer and one of the seven original trustees.

The story of the growth of the Society has never, as far as we are aware, been fully told, but in Sir Edward Sieveking's address of welcome to the members at the first meeting held in their new house in Hanover Square on October 22nd, 1889, will be found some notes of the nature of *mémoires pour servir.* The establishment of the Society was decided upon at a meeting held in the Freemasons' Tavern on May 22nd, 1805, Dr. Saunders, F.R.S., F.R.C.P., in the chair. The first officers of the Society, who were practically its founders, were William Saunders, President; John Abernethy, William Babington, Matthew Baillie, Thomas Bateman, Gilbert Blane, William Blizzard, Vice-Presidents; Astley Cooper, Treasurer; Alexander Marcet, Foreign Secretary, and John Yelloly, Secretary. The first meeting of the Society was held in Verulam Buildings, Gray's Inn, in December 1805. It was not, however, till 1809 that the first volume of the *Transactions* was published. It opens with a paper by Astley Cooper on Aneurysm of the Carotid Artery.

In 1810 the Society migrated to Lincoln's Inn Fields, where it abode, in different houses, till it moved, in 1834, to Berners Street, which continued to be its local habitation for more than fifty years. The first meeting was held there on February 3rd, 1835, the last on June 11th, 1889. Then it took possession of its present stately home in Hanover Square.

A very few years after its foundation, the Society made strenuous efforts to get a Royal Charter; these were defeated by the determined opposition of the Royal College of Physicians. That opposition, which was doubtless inspired by no higher sentiment than jealousy, was ostensibly based on the curious ground that "by certain Regulations or Byelaws of the said College, any tract or treatise on medical subjects, written by any Fellow or Candidate of the said College, or by any person licensed by the said College to practise physic, may be read at certain meetings of the said College, and if approved of, in manner as by such Regulations and Byelaws is required, will be directed to be printed at the expense of the said College,"

and that " the establishment of such Society by Royal Charter will be the means of depriving the College of Physicians of such tracts upon medical subjects as shall be written by those members of the College who shall likewise be members of the Medical and Chirurgical Society." This was in 1814. Some twenty years later, about the time the Society moved to Berners Street, it succeeded in getting the Charter, and was incorporated as the Royal Medical and Chirurgical Society of London. The Charter, it may be mentioned, was granted to Dr. Elliotson, Sir Astley Cooper, and Dr. Yelloly.

The house in Berners Street so long occupied by the Royal Medical and Chirurgical Society (No. 53) was originally built by Sir William Chambers as a dwelling for himself, and there he entertained contemporary leaders in literature and science. It was in that house that an incident took place which shows the tenderness of heart of poor Oliver Goldsmith, himself a member, if not exactly an ornament, of the medical profession.

It is related by Washington Irving as follows :—" He was one evening at the house of Sir William Chambers, in Berners Street, seated at a whist table with Sir William, Lady Chambers, and Baretti, when all at once he threw down his cards, hurried out of the room and into the street. He returned in an instant, resumed his seat, and the game went on. Sir William, after a little hesitation, ventured to ask the cause of his retreat, fearing he had been overcome by the heat of the room. ' Not at all,' replied Goldsmith, ' but in truth I could not bear to hear that unfortunate woman in the street, half singing, half sobbing, for such tunes could only arise from the extremity of distress ; her voice grated painfully on my ear and jarred my frame, so that I could not rest until I had sent her away.' It was in fact a poor ballad singer, whose cracked voice had been heard by others of the party, but without having the same effect on their sensibilities."

Of the later history of the Society there is little to relate. To it may be applied the maxim : " Happy is the nation that has no annals." It has continued to " exist beautifully " and by the high professional and scientific standard which it has steadily maintained, and by the fact that it has always had on its roll the most distinguished names in the profession, British and foreign, it deserves to be regarded as our premier medical society.

Reviews of Books.

A Manual and Atlas of Medical Ophthalmoscopy. By Sir
WILLIAM R. GOWERS, M.D., F.R.C.P., F.R.S., Physician
to the National Hospital for the Paralysed and Epileptic,
&c. 4th Edition. Edited by the Author and Marcus
Gunn, M.B., F.R.C.S., Surgeon to the Royal London
Ophthalmic Hospital, &c. London : J. and A. Churchill.
Price 14s. net.

SIR W. GOWERS's Manual is so well known to the medical
profession that there is no need to enumerate its good points.
In the present edition, as in the last, Mr. Marcus Gunn has
taken part, and the result of the joint work of the editors
is a book which should be in the hands of all medical men
who desire to avail themselves of the valuable aid in diagnosis
which the ophthalmoscope affords. We note that the brightly
coloured illustrations of the fundus oculi have now been re-
placed by more sober reproductions in sepia tint. The author
states that " the absence of colour is more than compensated
for by the attention, which its absence compels, to the more
important elements of form." Of this we are not quite sure.

*The Suppression of Tuberculosis, together with Observations
concerning Phthisiogenesis in Man and Animals, and Sug-
gestions concerning the Hygiene of Cow Stables, and the
Production of Milk for Infant Feeding, with special
reference to Tuberculosis.* By Professor E. VON BEH-
RING, University of Marburg. Authorised translation by
CHARLES BOLDUAN, M.D. First edition. 12mo. Pp. v
and 85. New York : John Wiley and Sons. Cloth,
4s. 6d. net.

AT a time when the suppression of tuberculosis is of such
universal interest as it is now, the publication of this little book
cannot fail to attract attention. Dr. Bolduan has done good
service in presenting to English readers Professor von Behring's
views. These views are embodied in the principal article of
the book entitled " The Cassel Lecture." We have read this

lecture with care and interest, and can confidently commend the study of it to English practitioners. Professor Behring, in reference to his immunizing principle, remarks that "the entire suppression of bovine tuberculosis is now only a question of conscientious and properly-conducted protective inoculations, and, of course, also a matter of time"; and further that, in reference to a case of apparent hereditary immunity, it was probable that the immunity possessed by this calf was derived from the milk of the immune cow with which it was nourished. Further on he says that the new principle he has discovered may be expressed thus, " *The milk fed to infants is the chief cause of consumption,*" and assigns as a reason that "the human infant is destitute of the protective agencies in his alimentary system, which at a later period of life prevent the entrance of disease germs into his tissues." Professor Behring, after many years of experimental work, maintains that he has conclusively demonstrated this, and does not hesitate to build upon it his entire plan for the suppression of tuberculosis. It may easily be inferred from the Cassel Lecture that Professor Behring does not wholly agree with Professor Koch in reference to the relationship between bovine and human tuberculosis, and in heartily commending this little book to the attention of the profession, we would draw attention to a remark of Dr. Edmund Cautley's the other day, when, in insisting on the duty of controlling the character of the supply of milk, he said, " The question of the spread of tuberculosis from cow to man through tuberculous milk was still 'sub judice.' At present it ought to be regarded as a possibility."

The Treatment of some Acute Visceral Inflammations; and other Papers. By DAVID B. LEES, M.A., M.D., F.R.C.P.; Senior Physician to the Hospital for Sick Children; Physician to St. Mary's Hospital. London: John Murray.

THIS book contains three lectures delivered before the Harveian Society in November 1903, and twelve papers which the author has published since 1880. In the lectures Dr. Lees urges :—(1) The necessity for repeated and careful determinations, by light percussion, of the size of the right auricle and of the left ventricle, in all diseases of the heart and of the lungs; (2) the importance of relieving a distended

right heart by leeches or moderate venesection ; (3) the value of the external application of ice as a local remedy in pneumonia, pericarditis, pleurisy, &c. ; (4) the advantage of largely increasing the amount of sodium salicylate given in acute rheumatism and chorea ; and the necessity of safeguarding these large doses by still larger doses of sodium bicarbonate.

Eight of the succeeding papers are concerned with cardiac disease ; those on acute dilatation of the heart in acute rheumatism, influenza, and diphtheria, being especially interesting. In a paper entitled " Is there a Dextro-cardiac Respiratory Reflex ? " Dr. Lees calls attention to the fact that paroxysmal attacks of dyspnœa, unaccompanied by cyanosis, not infrequently occur in cardiac disease, and he has observed in such cases that the right side of the heart was temporarily dilated. He suggests that the dyspnœa is really remedial, an attempt to relieve the engorgement of the right side of the heart, and that it may be the result of a special reflex action.

It is always instructive to read the opinions of an experienced hospital physician, and Dr. Lees lays stress on some points which are important and not sufficiently well recognised, but many physicians hold that his belief in the specific action of sodium salicylate in acute rheumatism is unfounded, and that the large doses which he recommends (*e.g.*, 100–200 grains in 24 hours, for a child 6–10 years old) are distinctly dangerous. Dr. Lees, himself, mentions a case of fatal poisoning.

A Manual of Ophthalmic Practice. By CHARLES HIGGINS, F.R.C.S.E. Second edition, revised and edited by ARTHUR W. ORMOND, F.R.C.S.E. London : H. K. Lewis.

THE second edition of Mr. Higgins' manual has been revised and edited by Mr. Arthur W. Ormond. It forms one of the many useful books contained in Lewis's Practical Series. In its new form it consists of 368 pages, and contains numerous illustrations. In criticising a volume of this nature, one must remember the class for whom it is written, and in the preface we are told that that it " is intended entirely for students and general practitioners ; it does not pretend to go deeply into the subject, but merely to give as much information as is likely to

be useful to those still engaged in their studies or in general practice." This being the case, it is absurd to expect the subjects to be so fully entered into as in some of the larger books. Were it not for this, we should have had to complain of important subjects being dismissed in a few words. Nevertheless, there is plenty in the book to occupy the student's attention, and it will be found to be trustworthy, and well suited as an aid to clinical study and to preparation for examinations. It is perhaps a pity that the rules regarding eyesight for the public services are not given, for the practitioner is often called upon to determine whether a certain person will be able to pass the tests required. It is almost impossible to remember these, unless one is constantly engaged in the work; and if they were given in a book like this, they could be looked up in a moment.

The Ocular Circulation. By J. HERBERT PARSONS, B.S., B.Sc., F.R.C.S., Arris and Gale Lecturer, Royal College of Surgeons. London: John Bale, Sons, and Danielsson, Ltd.

THE Arris and Gale Lectures of 1903, delivered at the Royal College of Surgeons by Mr. J. Herbert Parsons, the Curator at Moorfields, have just been published in book-form, and give a good account of the ocular circulation. The first chapter is on the anatomy of the eye, and is illustrated by numerous diagrams of the arrangements present in the animals, used by the author, in conducting his experiments, viz., rabbits and dogs. The second chapter is one on the physiology of the circulation, and describes the methods used for experimental purposes with tracings of the results obtained. Chapter III. is on the relation of the intra-ocular to the intra-cranial circulation, and reference is therein made to the excellent work on intra-cranial circulation done by Leonard Hill. Chapter IV. is perhaps the most interesting to the practical physician, discussing, as it does, such conditions as embolism of the retinal arteries, pulsation of the retinal vessels, and the effect on the circulation of such diseases as glaucoma, and the toxic effects of such drugs as quinine and tobacco. We can thoroughly recommend this little book as the most thorough and complete work existing on the subject.

Trachoma. By Dr. J. BOLDT. Translated by J. HERBERT
PARSONS, D.SC., F.R.C.S., Assistant Ophthalmic Surgeon,
University College Hospital; Ophthalmic Surgeon, Hos-
pital for Sick Children, Great Ormond Street; Curator,
Royal London Ophthalmic Hospital; and THOMAS SNOW-
BALL, M.B., C.M. With an Introductory Chapter by
E. TREACHER COLLINS, F.R.C.S., Ophthalmic Surgeon,
Charing Cross Hospital; Surgeon, Royal London Oph-
thalmic Hospital. London: Hodder and Stoughton.
7s. 6d. net.

THIS excellent work, written by Dr. J. Boldt, Staff Surgeon-
Major and Regimental Surgeon to the Ninth West Prussian
Infantry Regiment, has been recently published in Germany.
Dr. Boldt has had many years' experience of Trachoma in a
region where it is extremely prevalent, so that we look upon
the book as a standard work on the subject. The value of the
book is considerably enhanced by the excellent introductory
chapter, ably written by Mr. E. Treacher Collins, who gives an
interesting historical account of Trachoma in the British Isles
and in Britain's dependencies, and dealing especially with the
disease as it occurs in Egypt and India. Mr. Collins also deals
with the two main sources of the disease in this country, viz.,
the army and the poor law schools, and fully explains its
prophylaxis and treatment. One cannot help noting the strict
regulations, which are rightly enforced in the United States, to
prevent the introduction of the disease there, as compared with
the somewhat lax methods at present in vogue in this country,
whereby alien immigrants from Poland, Finland, Russia, and
Armenia, many of whom are affected with Trachoma, are allowed
without previous medical examination to enter. Chapter 1
deals with the history and epidemiology of the disease, going
back so far as 1553 B.C. The following chapter deals with its
geographical distribution. In Chapter 3 the symptoms and
course of the disease are described, and we are there reminded
that the granulations, which are formed in the tissue of the
inflamed palpebral conjunctiva, are not specific pathological
formations, but enlarged and inflamed true lymph-follicles
brought about by irritation. What brings about this irritation
in Trachoma has not yet been determined, but the contagious-

·ness of the disease depends upon an abnormal secretion from
the conjunctival sac. It should be noted that as yet all efforts
to discover the micro-organism of Trachoma have failed.
Chapters 4, 5, and 6 deal with the ætiology, diagnosis, and
prognosis of the disease, and we are informed that in Russia
Trachoma causes more blindness than any other disease.
Chapter 7 gives a full account of the treatment which has been
in use since the time of the ancient Egyptians, and it seems
that, so long as 3400 years ago, copper salts were employed.
The final chapter deals with the prophylaxis of the disease, and
gives an account of the methods which have been enforced in
Germany by means of which the disease is being stamped out
of the Prussian army, and its spread through the elementary
and secondary schools prevented. The translators are to be
congratulated on having introduced to English readers such an
interesting and important work, and we recommend the book
to all students of ophthalmology.

Manual of Practical Ophthalmology. By G. A. BERRY, M.B.,
F.R.C.S. Ed. Edinburgh and London : Young J. Pentland.

A RECENT addition to Pentland's Students' Manuals is one by
G. A. Berry, *Manual of Practical Ophthalmology.* It consists
of 570 pages with 233 illustrations.

The author's aim has been to produce a book which is both
short and practical, and to give expression to his individual
experience as regards diagnosis and treatment.

In this he has succeeded remarkably well, for although the
subject is not gone into with the detail of the larger books,
but little is said that may be considered superfluous.

It is interesting to hear individual opinions, but the method
recommended for performing an iridectomy for glaucoma will not
meet with universal approval. A keratome is used to make the
incision, a hook is used to withdraw the iris, and the portion
withdrawn is cut off with a single snip of the scissors either
by the surgeon himself or the assistant. It is impossible that
the iris can in this way be removed up to the periphery.

Refraction is gone into in a systematic manner, similar to
that found in most of the good text-books, and the final
chapter deals with the affections of the oculo-motor muscles.

There are no coloured ophthalmoscopic drawings, and it is never quite so satisfactory when these are produced in black and white. The book is nicely got up, is of a very handy size, and is likely to be popular with both practitioners and students.

Examination of the Urine. A Manual for Students and Practitioners. By G. A. DE SANTOS SAXE, M.D., Assistant Pathologist to the Columbus Hospital, New York. Illustrated. London : W. B. Saunders & Co. Pp. 391. Price 6s. 6d.

THIS book is divided into four parts apportioned as follows :— I. General considerations. II. Chemic examination of the urine. III. Microscopic examination. IV. Diagnosis of urinary diseases.

The first section contains a short account of the characters of the urine, some hints in regard to the selection of a specimen of urine for examination, and an account of the physical properties of normal and abnormal urines. In this the author describes a special method he has devised for estimating the specific gravity of very small amounts of urine.

In the second part the different chemical tests for organic and inorganic constituents of the urine are described.

Albumen is carefully considered and there is a valuable note on the sources and significance of albumen in the urine. The common clinical tests for albumen and their fallacies are first discussed, and then 17 further tests are shortly described and eight other tests receive mention. The author rightly remarks that "in practice it is a much better plan to use one or two tests as a matter of routine, to know these tests with all their possibilities and fallacies and not to burden one's self with too many tests and reagents."

Other proteids in the urine are then described, and in each case their clinical value is stated.

In dealing with the carbohydrates the same plan is followed. The clinical significance is noted, the usual qualitative and quantitative tests are carefully given, and other tests are stated shortly.

A chapter is devoted to "urea and its congeners" and another to uric acid and allied substances.

In the section on microscopic examination the different sediments, their significance, the manner of preparing them for examination and their differentiation are all considered. There is a short note of the methods of detecting the gonococcus and tubercle bacillus.

The last section is devoted to a description of the characters of the urine in various diseases, and includes short chapters on the diagnosis of the functional efficiency of the kidney and on the toxicity of the urine.

In an appendix advice as to the routine method of examination is given, and the necessary reagents and apparatus are stated.

Although this book extends to less than 400 pages, and is printed in large type, the author has succeeded in giving a very practical and complete account of the examination of the urine. And this is accomplished without apparent effort, for, although the descriptions are all concisely and shortly given, the writing is by no means stilted. The manual is intended as a guide to practitioners and students, and it is certainly the most useful and concise volume of this type that we have seen. Further, it is a relief to find a "manual" which is really a manual and does not require a bookrest. It is a "handy volume," not only from its practical utility, but also from its weight avoirdupois.

The illustrations are excellent, and the coloured plates, of which there are eight, are natural and well executed. There is a good index. The author is to be congratulated on the production of such a useful volume.

Anatomical Researches on the so-called " Prostatic Hypertrophy "
     and Allied Processes in the Bladder and Kidneys. By
     STANISLAUS CHIECHANOWSKI, Assistant Professor of
     Pathological Anatomy, University of Krakau, Austria.
     Authorised translation, edited by ROBERT HOLMES
     GREENE, A.M., M.D., Genito-urinary Surgeon to French
     Hospital, Surgeon to Workhouse and Penitentiary Hos-
     pitals, New York City. London : Henry Kimpton.
     Pp. 175. Price 5s.

THE title of this book indicates the nature of the contents. In these pages the whole question of the causation of enlargement

of the prostate is considered. The voluminous literature of the subject is fully and somewhat laboriously discussed, the author's conclusions from his researches stated and compared with those of others, and some views in regard to the origin and method of production of this disease expounded.

The significance of atheroma to the organism in general, and its relations to the urinary organs as a whole, and then to the kidneys, the bladder and the prostate are discussed. In regard to the bladder the author concludes that the preponderance of connective tissue in the bladder wall " is only apparent in cases not complicated by inflammatory processes," and he " denies the existence of primary bladder sclerosis in the sense of the French investigators." In opposition to the view advanced by Guyon and elaborated by von Lanois, he states that "the changes of the prostate gland, of the urinary bladder and of the kidneys . . . stand in no relation to arterio-sclerosis."

Three changes, the author believes, play a part in the production of bladder insufficiency in old people ; namely, atrophy of the bladder muscle, chronic inflammation, and obstruction to the outflow of urine. In the majority of cases these three causes are combined, more rarely two of them are in action and exceptionally, one may produce clinical symptoms.

In a long and somewhat abstruse chapter on the pathological histology of prostatic hypertrophy and prostatic atrophy the author states that "the so-called hypertrophy of the prostate gland, as well as certain forms of prostatic atrophy which are histogenetically related to it, have a common origin." The common starting point of these, according to Chiechanowski, is in productive connective-tissue processes in the stroma of the organ. If these changes are localised " in the central parts of the prostate " in the vicinity of the main excretory duct "they may produce a narrowing or obliteration of this duct which results in accumulation of the secretion and an enlargement of the peripheral lobules. The amount of enlargement depends upon the extent and position of the obstruction and in the amount of catarrhal inflammation of the tubules. If, on the other hand, the changes in the stroma mainly affect the peripheral part the terminal branches of the tubules are compressed by shrinking of the new-formed connective tissue, and

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atrophy results. This atrophy is more rapid and complete if no catarrh of the tubules is present.

The cause of the chronic inflammatory change in the stroma may be gonorrhœa, but this is not yet proved.

There is an extensive bibliography comprising 528 references.

Chiechanowski's work is laborious and is carefully described, and as a record of original investigation it is a valuable contribution to the literature of prostatic enlargement. The mass of detail, and the careful discussion of each minor point, make it difficult, at times, to follow the thread of the argument, and even when he sums up his conclusions at the end of a chapter he is apt to stray again into detail.

The book is neither more nor less than what the title indicates, a record of "anatomical researches," and as such it will appeal only to the few who set out to try to solve the problem of the causation of prostatic enlargement.

To those who cannot follow Chiechanowski in the original, this translation by Dr. Greene becomes a necessity.

Few translations equal the original book, and still fewer books gain by translation. Usually something is lost in the process, and in this book we venture to think a good deal has been lost. The translator adheres very faithfully to the original text too faithfully indeed to be agreeable to the English reader. German construction is often, to say the least, involved. German sentences and paragraphs faithfully translated into English become wearisome, at times even cryptic. But half the mental impression is produced by even valuable matter, when a constant effort to understand the meaning of the sentences must be exercised.

Dr. Greene would have done his subject more justice had he allowed himself more latitude in his translation. But worse than this are the many errors in grammar, in spelling, and in printing, which disfigure the book. Many of the pages appear almost to have escaped the proof-reader altogether. It would be interesting to know what objection the translator has to the term "connective tissue" which would explain the unsightly contraction "con.-tis." that he usually adopts. On pages 104, 105, and 106, to take three pages at random, the term "connective tissue" occurs 21 times and is four times printed "connective-tissue" and 17 times "con.-tis."

Although we believe that the editor has done those of the profession, who are unable to read German, a service in placing Chiechanowski's work within their reach, we cannot congratulate Dr. Greene on the care with which the translation has been produced.

Urine Examination made Easy. By THOMAS CARRUTHERS, M.A., M.B., Ch.B. London : J. and A. Churchill. Pp. 32. Price 1s. 6d.

DR. CARRUTHERS describes this little book as "a method of examining urine with the common tests fully described" and intends it primarily for the use of nurses.

This is the sketch plan of a series of elementary lectures on the examination of the urine, and, without amplification, it appears rather crude. There is no room for literary effect, for the pages present merely a series of short sentences, some of which are more forcible than artistic in their abridged form. Dr. Carruthers obtains his effects by varying "spacing" and different type, as many as eight or nine varieties of the latter to a page being the rule.

The book will no doubt be found useful for nurses if combined with the demonstrations that Dr. Carruthers evidently intends it to be. Taken apart from these, however, we doubt if the examination of urine would be rendered easier by its perusal.

Arhythmia of the Heart ; a Physiological and Clinical Study. By D. K. F. WENCKEBACH, Professor of Medicine, Groningen. Translated by THOS. SNOWBALL, M.A., M.B., Burnley. With seven plates and twenty figures in the text. Edinburgh and London : William Green and Sons.

IT is notably difficult to estimate correctly the significance of an irregular pulse, for it occurs in a vast number of different pathological conditions, and may be met with in persons apparently in good health, as well as in those in whom the sands of life are running low. If its pathology is indefinite, it is because the physiology of the cardiac action is still only a matter of theory, to which, however, Dr. Wenckebach has just made a notable contribution. It is true that his book

contains much experiment and theory, and but little of use to the physician, but it is, nevertheless, of much importance, as it is only by work of such a kind that our knowledge of cardiac conditions can be increased, and our clinical armamentarium strengthened. As the author observes, all the work which has been done with regard to the action of drugs upon the heart, needs now to be revised in the light of our fuller knowledge of the cardiac action, and our ideas as to the meaning of reduplication of sounds, cantering action, &c., require as well to be reconsidered.

The first chapter of the book is devoted to an exposition of the myogenic theory of the cardiac action, and Engelmann's classification of the various properties of the cardiac muscle, its excitability, its contractibility, its powers of stimulus-production and of stimulus-conduction. The phenomenon of the "extra-systole," and the various modifications of the pulse rhythm which it may cause, are considered at much length, and illustrated by many admirable cardiographic and pulse tracings; but the writer is forced to acknowledge that with the exception of these cases, in which a stimulus is applied directly to the cardiac muscle, we do not yet know its exact cause.

The second chapter contains an account of the physiological types of cardiac irregularity. The experimental evidence of defects in the conduction of stimuli is first considered, and the possibility of intermissions being due to such failure, as well as to extra-systoles, is pointed out, and the differences in the pulse tracings of the two classes are analysed. Dr. Wenckebach accepts Dr. Mackenzie's tracings as proof that auricular contractions may occur, without being followed by ventricular systoles, the so-called heart block; and though but little is known of its causes in man, he thinks it is probable that it may result from influences, acting directly on the cardiac muscle, as well as from those which act through the nervous system.

The disturbances of the contractibility of the heart, of its excitability, and of its power of stimulus-production are next considered, and a distinction is drawn between *arrhythmia*, the result of irregular production of stimuli, and *allorrhythmia*, where the rhythm of stimulus-production is unchanged, but the cardiac action is irregular from defects in the other cardiac functions.

The influence of the nervous system, the effects of disturb-
ances of its function, and the clinical significance of such
conditions, are briefly touched upon, and in the last chapter
an attempt is made to classify the clinical types of cardiac
irregularity. Dr. Wenkebach considers that in most cases
Traube's two-peaked waves, *pulsus bigeminus,* are the result
of extra-systoles, though in a small minority of cases a true
bigeminal action of the heart may obtain. He accepts
Dr. Mackenzie's evidence that cases of hemi-systole do occur,
evidence, which has been recently added to by Dr. Gibson, but
he insists that most cases are really examples of heart-block.

The book will well repay its perusal, and we must
congratulate Dr. Snowball on his excellent translation.

An Index of Symptoms as a Clue to Diagnosis. By RALPH
WINNINGTON LEFTWICH, M.D., late Assistant Physician
to the East London Children's Hospital. London : Smith,
Elder & Co. Price 6s. net.

WE welcome the third edition of this excellent little book, and
need only remark that the list of diseases is more complete
than in former editions, and that many new symptoms have
been added. The book will be found to be very useful by
senior medical students and newly-qualified men who are
intending to present themselves at the higher examinations in
Medicine and Surgery.

Textbook of Operative Surgery. By Dr. THEODOR KOCHER,
Professor of Surgery and Director of the Surgical Clinic
in the University of Bern. Authorised translation from
the Fourth German edition by HAROLD J. STILES, M.B.,
F.R.C.S. Edin., Surgeon to the Royal Edinburgh Hospital
for Sick Children, late Assistant Surgeon Edinburgh Royal
Infirmary. Pp. 440. 255 illustrations. London : Adam
and Charles Black.

WE give a hearty welcome to a second English edition of the
invaluable textbook prepared by that great master of surgery,
Professor Kocher, whose name has for so long been associated
with the ideas of thoroughness, sound judgment, operative
capability, and intelligent appreciation and application of the
work of others. In this edition the text has been much
increased, so that the work is now nearly twice as large as

formerly ; many new illustrations have been introduced, and not a few of these are coloured. The only drawback to this increase in size is that to keep the work within something like the same dimensions as the former, smaller print has been employed. The illustrations are still of the same character and dimensions, and some of the new ones are particularly good.

The work deals throughout with technique, and does not discuss questions of when and why particular proceedings are required. On the whole we think this is desirable, as otherwise the work would be as unwieldy as some other text-books on this subject. The arrangement remains the same as before. General principles are dealt with first, then special operations on various regions, those for exposing the vessels and nerves of the extremities, and then, lastly, amputations and excisions. The first section will well repay reading by everyone interested in operative surgery, as it represents the matured outcome of a great experience. Local anæsthesia is much commended, and its methods of application described in some elaboration. Medullary anæsthesia is not recommended since it is more dangerous and associated with more un-pleasant after-effects than when a general anæsthetic is used. For the latter purpose Kocher now generally employs bromide of ethyl followed by ether. 20 to 30 grams are put into a mask covered with impermeable tissue, and the patient is usually anæsthetic in 60 seconds, and there is no need to follow it by large doses of ether : in practice this method seems to work admirably. As regards aseptic technique the most interesting point is that Kocher condemns cotton or linen gloves, but maintains the value of those made of sterilised india-rubber.

As to the actual operations it is impossible in a short review to go through them in detail, and to discuss the many modifica-tions noted in this edition. A few only can be mentioned. Kocher seems to have abandoned the operation, known by his name, for removal of the tongue, and to have reverted to that which involves division of the symphysis. The glands are to be dealt with either before or after, on a separate occasion, so as to avoid the risks of infection of the large wounds that modern require-ments tell us must be made. Naturally the operation for goître is very fully described and well illustrated, and the success of his measures can be gauged by the statement that of the last

1,100 cases (of a total of 2,160) only 3 deaths have occurred. In the abdomen the great modifications associated with present-day methods are fully recognised, but we note that no reference is made to the use of bobbins, buttons, and such-like contrivances for intestinal anastomosis. Prostatectomy is but poorly represented, and only the perineal operation is mentioned. Amongst the excisions we notice a valuable suggestion for arthrotomy of the knee, which we should imagine would give excellent results. There are, however, no descriptions of methods of dealing with fractures, or of any of the pelvic operations upon uterus or ovaries. Those who know anything of the character and scope of Professor Kocher's work, both as teacher and as practical surgeon, will gladly receive this expression of the master's opinions, and to those who are not yet conversant with his powers we would give the advice to get the book and study it carefully. The translation has been most efficiently performed, and the stilted diction so frequent in such works is noticeably absent.

An Introduction to Dermatology. By NORMAN WALKER, M.D. Bristol: John Wright & Co. Third edition. Pp. xiv and 284. Price 9s. 6d.

IN reviewing this book five years ago we expressed the opinion that it would find a place among the shorter treatises on Dermatology, and the appearance of two new editions since that time has proved this forecast to be correct. The present volume is brought well up to date, and although it contains slight alterations where necessary it has not been notably increased in bulk, and retains all the positive clearness which is so useful to the student. It is natural in such a book that there should be many decided opinions with which everyone will not agree, and it seems to us that, in view of the microscopic bacteriological examination of the scales, it is no longer reasonable to hold that psoriasis and seborrhœic eczema are merely different forms of the same disease.

There are some new photographs, most of which are good, and there still remain some not very successful coloured plates. Looking at the book as a whole Dr. Walker is to be congratulated on having produced an excellent elementary text-book on Dermatology, and on having maintained its simplicity through three editions.

Notes by the Way.

THE President of the Royal Medical and
The Federation of Chirurgical Society, Sir R. Douglas Powell,
London Medical in his address at the annual meeting held on
Societies. March 1, preached on a text very familiar to
readers of THE PRACTITIONER. In view of the overlapping
and waste caused by the isolated working of the various
societies, he suggested that their activities should be co-
ordinated, and that the question of their federation should
be seriously considered. A motion that the leading medical
societies of London should be invited to hold a joint meeting
" for the purpose of considering the advisability of amalga-
mating, and to take the necessary preliminary steps for that
purpose," was carried unanimously. As Sir R. Douglas Powell
himself pointed out, this is not by any means the first time such
a suggestion has been made. In the address delivered by
Sir Edward Sieveking at the first meeting of the Society in
its new house in Hanover Square, on October 22, 1889, he
recalled the fact that, when he was Secretary to the Society,
there was a prolonged agitation on the subject of establishing
a fusion of the numerous societies formed for the promotion
of distinct branches of the medical profession. He added
that he could not then see how the various difficulties in the
way of the execution of a plan which, theoretically, promised
very well, were to be removed; nor did he think that the
difficulties were less when he was President, or that there would
be a greater prospect of success if the different societies took
up the question at that time. He pointed out, however, that as
several societies were in future to have their abode under the
roof of the Royal Medical and Chirurgical Society, there would
be many opportunities of carrying out objects that an Academy
of Medicine would have in view, " but which would be, perhaps,
even more energetically and beneficially realised by the co-
operation of societies that are now distinct in their objects,
their means, and their government." He proceeded to say
that there were many questions of medical science and medical
government which would be more completely solved and

more actively prosecuted by joint committees of the six scientific societies working with the Royal Medical and Chirurgical Society than could be achieved by any one of them carrying on their labours alone. Nothing came of the suggestion. Nevertheless, the project continued to be discussed, and it found strong supporters in Sir Andrew Clark, Sir Joseph Fayrer, and other leaders of the profession. Had Sir Andrew Clark lived the scheme would probably had been been carried into effect. The substance of a memorandum drawn up by a very distinguished physician, in which three alternative schemes for the formation of an " Academy of Medicine for England " were sketched out, was published in THE PRACTITIONER for June, 1899. One was to form an Academy by federation of the principal medical societies of London and the provinces, each retaining its autonomy, but owing allegiance to a central authority consisting of a president, a council, and representatives of the societies, to be chosen by the council, to the number of 200 or 300 or more. These would form the ordinary members of the Academy. The other fellows and members of the societies would be associates or correspondents of the Academy. Each society would have its own officers, but the Academy would be governed by the president and council. The Academy might be divided into sections of medicine, surgery, pathology, and so on. Each society would continue to publish its *Transactions* and *Proceedings,* while the Academy would publish separately a volume of papers selected by the council from those read at any of the societies. A second scheme was to constitute an Academy by selecting from the principal societies in existence the members who might be deemed worthy of such a distinction. This Academy was to have no other relation with the societies than those of friendly intercommunication, and was in fact to be a new and distinct body. The third scheme was to make the Royal Medical and Chirurgical Society the nucleus of an Academy. A certain number of the fellows of that body with selected members of other societies would form the Academy.

All these schemes are, of course, open to criticism in detail. It may, for instance, be doubted whether an Academy of Medicine for England, or the whole kingdom, can ever be more

than a beautiful dream. There are so many conflicting elements in our motley nation that such a union is scarcely within the sphere of practical politics. But the unification of medical London, and the focussing of the rays of light emanating from the various existing societies which are now scattered and lost, are possible as well as desirable. The union into one powerful organisation of the societies now isolated would be like the welding of a number of independent states, each pursuing its own aims and guarding its own interests, into a strong united empire. In such a body there would be a co-ordination of work that would prevent the great waste of force that now takes place, when papers on the same or nearly allied subjects may be presented to several different societies and discussed separately. Such a body would also be the official and authoritative mouthpiece of professional opinion on questions which it is within the province of medical science to decide. For the want of such a body the profession has at present no official voice in the counsels of the nation. There will necessarily be considerable difficulties in the way of carrying the unification scheme into effect, but its advantages are so great and so obvious that no petty jealousies should be allowed to hinder its accomplishment.

*   *   *   *   *

Hospital Reform. THE conference which took place on March 2 to discuss the question of hospital reform was not so futile as most previous meetings for the same purpose have been. Though it did not achieve very much, it affirmed two or three sound principles. Of these the most important is that poverty, and not influence exercised in the form of subscribers' letters, should be the essential condition for the admission of patients to the benefits of hospital treatment. The desirability of proper inquiry into the circumstances of applications with the object of preventing abuse of the charity by persons able to pay a private practitioner was accepted without discussion or demur. Last, but by no means least, was a resolution that the number of new cases to be seen on any day by the honorary staff should be limited. If this is adopted as a rule of hospital administration, one of the most valid objections to the out-patient system will be removed. The

question of payment by patients was shelved after a heated discussion. This is a matter on which a strong feeling naturally exists among doctors whose way of professional life lies within the sphere of influence of a great hospital like the London, where a small charge is made to patients. A hospital which exacts a fee, however trifling, from patients, enters into direct competition with the local practitioners, who, of course, find it almost impossible to stand their ground against so formidable a rival. It is to be hoped that this question will be more satisfactorily dealt with by the mixed lay and medical committee which has been appointed to urge on the hospitals the adoption of a policy at once liberal in the largest sense to deserving sufferers and just to the public and to the medical profession.

*   *   *   *   *

Medical Training and the Hospitals. IN reporting on the financial relations between hospitals and medical schools, the committee appointed by H.R.H. the Prince of Wales, as President of King Edward's Hospital Fund, said, " We have formed the opinion that a broad line of distinction ought to be drawn between the studies of the first three years of a medical student's curriculum and the studies of the last two years, or, in other words, between the preliminary and intermediate studies on the one hand and the final studies on the other ; " and further, " that the attempt of many of the hospitals to associate themselves with schools teaching the preliminary and intermediate subjects is a great, if not the chief, source of the exhausted condition of the funds of many of the schools, and the consequent demand of the schools upon the funds of the hospital." Commenting on this report, Dr. Kingston Fowler, the Dean of the Medical Faculty of the University of London, presses the claims of that University for financial help in the establishment and endowment of an Institute of Medical Science under the control of the University. The case is a strong one. Of late years there has been a steady decline in the entries of students at the London Medical Schools, a decline of as much as 40 per cent. in the last 20 years. Through the liberality of wealthy citizens of large cities in the provinces, Universities with Medical Schools, well endowed, have sprung up, while the finest City in the world,

with its enormous advantages, has to a great extent been
neglected. The result is that, with one or two brilliant
exceptions, the preliminary subjects are being better taught
in the provinces than in London, with better apparatus and
appliances and better paid teachers. It is clear, in the interest
of the students and the hospitals, that the time has come for
the establishment in the metropolis of one or more well-
equipped preliminary Medical Schools, so that the present
schools may abandon that portion of the training for which
they were not originally intended, and devote themselves
entirely to advanced medical and surgical instruction which no
other schools in the country are better fitted to afford.

     ✱   ✱   ✱   ✱   ✱

IN our issue of last September we drew
Ankylostomiasis.   attention to the views of Dr. Elliott Smith
with reference to the method of infection
in this disease. It was therein stated that in such a case
the worm would have to pass from the skin to the blood or
lymph, thence to the lungs, and from the lung by way of
the bronchi and trachea to the œsophagus, thus reaching the
stomach and duodenum. We then stated that very positive
evidence would be necessary to make us believe that this
is the usual route followed. It is interesting to note that
because of the appearance of this disease in England and
on the Continent, Dr. Malcolm Mason, the chief health officer
of New Zealand, remarks that the disease, which is absolutely
preventable, is caused by a small worm, and the general
symptoms are pallor, breathlessness, palpitation, pain over
the stomach, irregularity of the bowels, and sometimes bleed-
ing. He draws attention to the fact that the worm usually
inhabits the upper portion of the small bowel, and that the
ova come away in the patient's motions. For want of privy
conveniences, the miners defæcate upon the ground, when the
eggs are kept alive by the warm moist air of the pit. Every-
thing below becomes contaminated, and during meal time,
many of the eggs become attached to the hands and food,
thus reaching the stomachs of the men. Since this is the only
way by which the worm obtains an entrance to the system,
steps can easily be taken in order to prevent the spread of

the disease. (1) No pit water should be drunk ; (2) Proper accommodation should be provided below for defæcation ; (3) The utmost care should be taken to ensure cleanliness when food is partaken. Simple precautions like these, if insisted upon, will go far to prevent the spread of ankylostomiasis and to ultimately stamp it out.

* * * * *

Human and Bovine Tuberculosis. DR. NATHAN RAW has followed up the interesting paper on the relationship between human and bovine tuberculosis which was read at the Medical Section of the British Medical Association, and to which we referred in a previous number, by a valuable article in "Tuberculosis." In that he expresses his opinion that the diametrically opposite views held by Professor Koch and Professor von Behring, constitute a problem which could not be solved by laboratory experiments only, but that additional light can be thrown upon it by extensive clinical observation and pathological study, and by carefully noting the behaviour of tuberculosis in humans and domestic animals. His views, based upon the observation of over 3,000 cases of phthisis and other forms of tuberculosis, and also upon a study of nearly 600 autopsies in such cases, are that human and bovine tuberculosis are distinct and different varieties of the same species, and are capable of setting up a different train of symptoms at different periods of life, and according to localisation of infection ; that the great majority of cases of phthisis pulmonalis are accounted for by the fact that the lungs are generally affected by inhalation of bacilli from a previous case of phthisis or accidental inhalation of dried tubercle bacilli; that intestinal tuberculosis and tabes mesenterica are not human tuberculosis, but bovine in origin. Hence that man is attacked by two distinct varieties of tubercle, one conveyed by infection from one person to another, the other by receiving into the body the bovine bacilli in milk or meat. In support of this he observes that during the last 50 years human phthisis has diminished to the extent of over 45 per cent., but that abdominal tuberculosis in children has increased by over 20 per cent., and that tuberculosis in English cattle is rapidly increasing. He also lays

great stress on the fact that out of 300 cases of tabes mesenterica, he has never known one to occur in a child which has been fed strictly on the breast, all without exception having been reared on cow's milk for some considerable period.

With regard to scrofula, which is nothing more or less than tuberculosis of the lymphatic glands, he considers it a purely local affection, produced by the absorption of tubercle bacilli in milk through the tonsils and pharynx, and he strongly inclines to the opinion that tuberculous meningitis is a bovine tuberculosis. Further he states that mild bovine infection confers a certain immunity against phthisis in the same way as vaccination does against smallpox. The facts upon which Dr. Raw bases his opinions are highly instructive, and impress upon us the paramount importance of a rigorous inspection of all dairies and of sterilising the milk previous to its use.

*   *   *   *   *

Competitions. THE result of the February competitions is as follows :—The best essay was sent in by Dr. James Hitchcock, Notting Hill, W. The best answers to the three questions were written by Dr. Leonard Joseph Kidd, Stratford Place, W. Cheques have accordingly been sent to these gentlemen.

Practical Notes.

ACUTE BRONCHITIS.—With the frequent changes of weather, which are characteristic of the early spring, this malady commonly occurs. In young children and old persons, especially in those who suffer with chronic bronchitis and emphysema, the disease is serious, but in healthy young adults it need not cause much alarm for it can be much more easily subdued. In children and old persons it is very liable to be followed by capillary bronchitis and bronchopneumonia. Correct early treatment is, therefore, most important in order to prevent, if possible, these serious complications. The treatment of acute bronchitis may be readily described in two stages : first, that during the onset and the early *dry* stage ; secondly, that during the later or *moist* stage.

If an adult, previously healthy, be attacked with acute bronchitis after exposure to cold or wet, he should take a hot bath, dress in flannel, and at once go into a previously-warmed bed, preferably between blankets. A lightly made hot linseed-meal poultice containing mustard should be put on the upper part of the chest. This may remain for from two to three hours. When it is cold it should be removed, the chest thoroughly dried with a clean dry towel, and a piece of hot flannel then applied. A purge should be taken, which may be followed by a tumbler of *hot* lemonade. If the cough is dry and distresses the patient he may take Pulvis Ipecacuanhæ Compositus gr. x., which will soothe and induce sleep. A bronchitis kettle should be placed on the fire so that the temperature of the room may be kept constant (between 60° and 65° F.) throughout the night, and the atmosphere kept moist. The following medicine will be found useful :—

℞ Liq. Ammonii Acetatis - - - ʒj.
Spiritus Ætheris Nitrosi - - - ʒss.
Vini Antimonialis - - - - ℳ x.
Vini Ipecacuanhæ - - - - ℳ x.
Aquæ Chloroformi - - - - ad ℥j.
Misce. Ft. Mist.

Or

℞ Liq. Ammonii Acetatis   -   -   - ℨj.
   Potassii Citratis   -   -   -   - gr. xij.
   Vini Ipecacuanhæ -   -   -   - ♏ x.
   Syrupi Tolui -   -   -   -   - ℨj.
   Aquæ Chloroformi -   -   -   - ad ℥j.
Misce.   Ft. Mist.
Two tablespoonfuls to be taken every four hours.

As the result of this treatment it will be found that the cough becomes looser and that the expectoration will increase. The patient, as a rule, breathes more readily and is more comfortable.   In this moist state expectorants are usually given, one of the most commonly used medicines is the following :—

℞ Ammonii Carbonatis   -   -   -   - gr. iij.
   Vel Ammonii Chloridi   -   -   - gr. xij.
   Tincturæ Scillæ   -   -   -   - ♏ xij.
   Infusi Senegæ   -   -   -   - ad ℥i.
Misce.   Ft. Mist.

Two tablespoonfuls to be taken three times daily.

Patients occasionally find great relief from inhalations of steam containing Tincture Benzoini Co. ℥i. to Oss of very hot water.   A very convenient method is to place a sponge saturated with the tincture in a cage at the top of the spout through which the steam passes.

In treating the acute bronchitis of children care must be exercised with the Dover's powder, but it is better not to give it in very young children, and in their case a warm cotton-wool jacket is preferable to a hot linseed-meal poultice.   Dyspnœa is common, for they find it difficult to get rid of the bronchial secretion.   In these circumstances it is well to give an emetic, which helps to clear out the secretion in the bronchial tubes. The emetic usually given is Vinum Ipecacuanhæ ℨ iv., and if the dyspnœa is not speedily relieved this should be repeated.

In infirm persons it is as well not to give Dover's powder, especially if there is a tendency to cyanosis and cardiac weakness, as a rule also Vinum Antimoniale is contra-indicated. Sometimes cyanosis becomes very marked.   This usually indicates that the right side of the heart is over-distended with blood which it is unable to pump through the lung capillaries

In these circumstances it is often advisable to perform phlebotomy and withdraw from the median basilic vein about twelve (measured) ounces of blood, at the same time administer hypodermically Liquor Strychninæ Hydrochloridi ♏v. The pressure in the right side of the heart is thus relieved and the tonus of the cardiac muscle increased. As a rule the cyanosis soon disappears, and the patient is much relieved. Brandy is often indicated in feeble persons.

THE HEADACHES OF INFLUENZA.—For practical purposes these may be said to occur at two distinct periods, namely, during the attack of influenza and during the period of convalescence. The nervous type of influenza is characterised by severe frontal or vertical headache with profound prostration. It must, however, be borne in mind there may be gross organic lesions present, such as meningitis, encephalitis, and cerebral abscess, which may be the cause of such headaches. Before treating them, the optic discs should be carefully examined, so as to exclude, if possible, any error which might arise from overlooking these cerebral complications. The patient should be kept absolutely at *rest in bed*, and as quiet as possible, in a room which may be darkened. The bowels should be kept free, and a light nutritious diet administered. Phenacetin gr. v. should be given, repeated if necessary in 12 hours, or the following may be tried :—

℞. Antipyrine - - - - - gr. vi.
    Quininæ Sulphatis - - - - gr. iij.
    Spiritus Ammoniæ Aromatici - - ♏ xx.
    Aquæ Chloroformi - - - - ad ℥i.
Misce. Ft. Mist.

Should the headaches arise during convalescence, these are usually frontal or frontal and vertical, or occasionally occipital. All possibility of any obvious cause should be excluded. The diet and bowels should be regulated ; the urine should be examined for albumen and sugar, the teeth should be examined, the vision should be tested, and the fundus oculi examined with the ophthalmoscope. As a rule these headaches are accompanied by other signs of neurasthenia, with mental depression, and they may be treated as follows :—Quiet and

rest from all work and worry, this *rest treatment* is most essential; a good nourishing diet may be ordered, and some form of light red wine. The following drugs will be found useful :—

℞. Antipyrine - - - - gr. iij.
Caffeinæ citratis - - - - gr. v.
In pulv. - - - - - i.

Should the patient be at all anæmic, one of the following prescriptions may be used :—

℞. Potassii Bromidi - - - - gr. x.
Liquoris Arsenicalis - - - ℳ iii.
Infusi Gentianæ Comp. - - - ad ℥ i.
Misce. Ft. Mist.

Or

℞. Ferri et Quininæ Citratis - - gr. v.
Tincturæ Nucis Vomicæ - - - ℳ v.
Spiritus Chloroformi - - - ℳ x.
Infusi Calumbæ - - - ad ℥ i.
Misce. Ft. Mist.

TYPHUS FEVER.—As at the present time when there are some cases of Typhus fever in this country, it will doubtless prove useful to the practitioner to have placed before him the chief points of importance in the diagnosis between Typhus and Enteric fever, although it must be remembered that in sporadic cases the diagnosis is often extremely difficult. At the same time it may be comparatively easy in epidemics. The following facts should be kept in mind in considering the diagnosis of Typhus :—

(*a.*) There is no preliminary epistaxis, though there may be bronchial catarrh.

(*b.*) The onset is sudden, often with a rigor, the temperature rising to 102° or 103° F. in 12 hours.

(*c.*) The pupils are equally contracted, the expression is dull.

(*d.*) The conjunctivæ are suffused and the face generally congested.

(*e.*) Nervous symptoms and great prostration are early pronounced.

(*f.*) The pulse is quicker than in enteric and is not usually dicrotic.

(*g.*) The abdomen is as a rule normal; it is not tender.

(*h.*) There is no diarrhœa and no hæmorrhage from the bowel.

(*i.*) There are red papular spots, which appear from the third to the fifth day; they do not come out in crops. Hæmorrhage takes place into the spots later, these appear on the trunk and extremities.

(*j.*) There is subcuticular mottling.

(*k.*) Coma vigil is not infrequent.

(*l.*) The blood does not give the agglutination test.

(*m.*) The temperature varies between 101° and 104° F. for about 12 to 14 days, and then comes down more or less abruptly, crisis sometimes occurring.

OPHTHALMIA NEONATORUM.—The newly - born child acquires this disease at birth, for as the head passes through the vagina any discharge, either a simple leucorrhœal or gonorrhœal one, from the maternal parts is liable to penetrate the palpebral fissure of the child and infect the conjunctival sac. This causes in two or three days after birth an acute purulent conjunctivitis, or, as it is often called, Blennorrhœa neonatorum, and is characterised by swollen red lids, which are frequently stuck together. When separated a purulent discharge is observed, and it is seen that it is the palpebral conjunctiva which is most affected. If the disease is not recognised, or remains untreated, the cornea is likely to become infiltrated and finally perforated, producing ultimately partial or complete blindness. Every possible precaution should be adopted to prevent the disease, and when it does occur energetic treatment should be employed at once. The treatment of the disease may be conveniently described under the two headings:

(1.) *Prophylactic*, (2.) *Curative.*

(1.) *Prophylactic Treatment.*—If the mother is suffering from gonorrhœa, every effort should be made to cure it before

parturition. Should it be discovered that there is a vaginal discharge before the head of the child engages the pelvis, the vagina should be washed out with a weak antiseptic solution, such as 1 in 2000 followed by 1 in 4000 of perchloride of mercury. Directly the child is born its face should be carefully washed over with water which has been previously boiled, especial care being taken to thoroughly wash away any discharge which may have got into the eyelids, and during the first bath the water used must *not* come in contact with the child's face. Should, however, it be suspected that the vaginal discharge has entered the palpebral fissure, after the face has been washed, the lids should be separated and the eyes washed out with a warm solution of mercuric chloride (1 in 6000), and then one or two drops of a solution of silver nitrate (2 grains to the ounce), or two or three drops of argyrol (20 per cent.), or a few drops of protargol (20 per cent.) should be dropped into each eye. The eyes should then be carefully watched for two or three days in case there should be any purulent discharge from the conjunctival sac.

Silver nitrate should not be introduced indiscriminately into the eyes of all newly-born children, but only into those in which one suspects infection. The method advocated by Credé is to put into the eyes of all children soon after birth a few drops of 2 per cent. silver nitrate solution. This produces a mild catarrh, but it is said there is no fear of any corneal opacities following.

(2.) *Curative Treatment.*—Should it be discovered, on the second or third day after the birth, that the lids of the child are red and puffy, they must be carefully opened and all discharge washed away with warm mercuric chloride solution (1 in 5000) :—

R. Hydrargyri Perchloridi - - - gr. $\frac{1}{10}$.
    Aquæ Distillatæ - - - ad ʒj.
Ft. Collyrium.

and this should be continued every hour so as to completely wash away all discharges. The palpebral conjunctiva should then be painted over with a solution of silver nitrate (10 grains to the ounce), and the conjunctival sac should then be immediately washed out with a saturated solution of sodium chloride to neutralise the effect of the silver nitrate. This may be done

every day until the discharge ceases. Before applying the silver nitrate solution to the palpebral conjunctiva, it is advisable to carefully dry the lids with soft lint. More recently it has been suggested to paint the lids with 50 per cent. argyrol (silver vitellin=30 per cent. silver nitrate); which is less irritating and quite as effective as silver nitrate. Should the cornea be at all hazy it is well to drop into the eyes once a day a solution of atropine sulphate (2 grains to the ounce). This dilates the pupil and tends to prevent any iritis. The margins of the lids should be smeared with a little Unguentum Cetacei or unscented Vaseline, so that the lids do not become adherent during the time that the child sleeps. This treatment should be persevered with for a week or ten days, when, as a rule, the discharge ceases. The cornea rarely escapes altogether, and, if no other of the more common complications has occurred, it is found to be nebulous. In order to clear these slight opacities it will require the local application to the lid margins of an ointment made up as follows :—

℞. Unguenti Hydrargyri Oxidi Flavi -   - pt. i.
Paraffini Mollis   -   -   -   - pt. iij.
Ft. Ung.

A piece about the size of a small pin head to be brushed inside the margin of the lower lid every night. This treatment should be persevered with for some months, but as a rule the cornea does not get completely clear. In all cases of ophthalmia neonatorum it is essential to have a good view of the cornea. The practitioner will usually find this a difficult matter because of the small size and delicacy of the parts. This may be overcome by fixing the child's head between the knees, which have been previously covered with a towel, and then by gently separating the lids with proper lid retractors, care being taken to exercise no pressure upon the eyeballs, otherwise rupture of the globe may take place, which would naturally end in blindness.

Novelties and Notices.

SANATOGEN.

(The Sanatogen Company, 83, Upper Thames Street, E.C.)

This valuable preparation has now been before the medical profession for over five years, and has been extensively used both at home and abroad. Sanatogen consists of 95 per cent. of pure casein, derived from caseinogen, the most abundant proteid of milk, and 5 per cent. of glycero-phosphate of sodium. It is an excellent nutritive material which is especially useful in chronic wasting diseases associated with progressive weakness, and is a useful adjunct to other remedies. Many experiments have been performed with Sanatogen, and the general conclusion come to is that it is easily digested, completely absorbed, and readily assimilated by the individual.

KUTNOW'S POWDER.
(Improved Effervescent Carlsbad.)
(Messrs. Kutnow and Co., 41, Farringdon Road, E.C.)

This powder contains the active principles of the various Continental spring waters, and is a very useful remedy to be prescribed in cases of chronic dyspepsia, sluggish liver, and chronic constipation. It is exceedingly agreeable to take, and mild and efficacious in its action. It has a great advantage in containing no sugar, and may, therefore, be given to those suffering from diabetes mellitus.

CYLLIN.
(Messrs. Jeyes' Sanitary Compounds Company Ltd.,
64, Cannon Street, London, E.C.)

We have received from Messrs. Jeyes two preparations, one of which is Cyllin disinfectant, formerly sold as Jeyes' Creolin. This is a non-poisonous coal-tar disinfectant free from carbolic and cresylic acids, and forms a milky emulsion when put into water, and is a most useful and pleasant disinfectant. Also Cyllin (medical) for medical and surgical purposes, which may be used in 1 in 200 solutions for disinfecting the skin, and to

1 in 400 solutions for the more delicate mucous membranes. These preparations are especially valuable in destroying micro-organisms. Cyllin has a high carbolic acid co-efficient, and is a really cheap disinfectant when compared with many of the better known substances sold as such.

A NEW STETHOSCOPE CHEST-PIECE.

(Messrs. Reynolds and Branson, 13, Briggate, Leeds.)

In this new chest-piece invented by Dr. F. W. Cory, of Ossett, there are two holes for the stem, one at the top, the other at the side. It can be used in the ordinary way, the side hole being closed by the finger. If the side hole be uncovered before withdrawing it from the skin, no unpleasant suction in the ears is experienced as is the case with the ordinary stethoscopes. Another distinct advantage is that with the stem in the side hole it can be readily slipped between the clothes and the skin. It is especially useful, therefore, for the examination of women where undue exposure is undesirable. We consider the instrument a very useful one.

A NEW MEDICAL PRICE LIST.

We have received from Messrs. Brady and Martin, Ltd., of Northumberland Road, Newcastle-upon-Tyne, their new medical price list of drugs, medical and surgical instruments and microscopes. The book is of a convenient size, extremely well arranged, and makes a neat little volume.

A LOCK AND KEY BOTTLE FOR POISONS.

(Messrs. T. Christy and Co., 4, Old Swan Lane, E.C.)

We have received a new patent bottle, with lock and key, especially constructed for poisons. It appears to us to be a very useful invention, and one likely to greatly reduce the number of cases of accidental poisoning.

COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the March Competitions will be announced in the May number.

a.—The Subject of the Essay for April will be

The Treatment of a Strangulated Inguinal Hernia.

b.—Answers to the following questions are invited :—

1. What are the causes of splenic enlargement ?

2. In what circumstances does pulsating exophthalmos occur ?

3. A female, unmarried, aged 35, with a previous history of good health, before the present illness began, was admitted into hospital with the following history :—Six months ago she developed a cough and was suddenly seized with severe haemoptysis, rest in bed was ordered and continued for four weeks, during this time she continued to cough and expectorated blood-stained material. She improved and was able to get up and perform her home duties though she suffered from anaemia, shortness of breath, and night-sweats. She lost flesh and had continuous pain over the chest. On admission to hospital the following were the physical signs :— Impairment of respiratory movements over left side of thorax, though the intercostal spaces were more prominent than on the right side. The superficial veins of the chest and neck were dilated. The whole left side of the thorax was dull to percussion, and this extended over the cardiac area to the right side of the sternum, tactile fremitus was diminished. The right side of the thorax appeared normal. On auscultation there was faint tubular breathing over the left side, and over the right side the breath sounds were exaggerated and a few moist râles heard. The cardiac impulse could not be seen or felt. On auscultation the apex beat was found to be in the sixth left interspace in the nipple line. The cardiac sounds were heard with difficulty. The liver was enlarged downwards, the splenic dulness was normal, there was no ascites. There was oedema of the ankles, which rapidly spread to the thighs. The patient complained of pain over the left side of the chest and in the upper part of the abdomen. The cough was persistent, and the patient expectorated blood-stained yellow material in which no tubercle bacilli were found. The pulse was soft and 84, respirations 26, temperature varied between 97 and 100. The urine contained a trace of albumen. The patient continued to lose flesh, the appetite got less, dyspnoea increased, so that the patient had to be propped up in bed, and after being in hospital for six weeks the patient died. What was found on post-mortem examination ?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner " Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of May, 1905. No Essay must contain more than two thousand words, and the Editor reserves the right to publish any Essay, which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions, must be marked on the top left-hand corner " Questions," and must be sent to the Editor on or before the 1st day of May, 1905.

A and B.—(1) One side of the paper only must be written on.

(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

SOME CASES OF ANEURYSM.[1]

By G. A. GIBSON, M.D., D.Sc. (EDIN.), HON. LL.D. (ST. AND.),
F.R.C.P. (EDIN.),

Physician to the Royal Infirmary, Edinburgh.

[With Plates XXXII.—XXXV.]

IT seems to me that we could not better utilise the present
occasion than by taking the opportunity afforded by the fact
that five cases of aneurysm are now in my wards in order to
discuss some aspects of this interesting affection. The remarks
about to be made will be largely devoted to the symptoms and
diagnosis of the disease, but some matters concerned with
prognosis and treatment will necessarily arise in connection
with the subject. Without further preface the different patients
will now be presented to you.

Case I.—R. R., aged 40, blacksmith, who had served with
the Imperial Yeomanry in South Africa as a farrier, was
recommended by Dr. Watson, of Wemyss, to Ward XXIX.,
February 1, 1904, on account of breathlessness and cough
which had troubled him for six months.

It is found that the patient is only comfortable when
sitting upright. He has a harsh brassy cough, and a loud
stridor, while the voice is hoarse and monotonous. There is
no difficulty in swallowing. On examination of the thorax
there is some pulsation on both sides of the manubrium, but no
projection of any part of the chest is present. No thrill can be
detected. On percussion, the right and left borders of the
heart are found to be respectively 2½ and 4½ inches from mid-
sternum ; there is an area of dulness above the præcordia, ex-
tending as high as the first rib, and stretching 2½ inches to right
and 1¾ inches to left of the midsternal line. On auscultation,
no murmur has at any time been detected, but the aortic second

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R R

sound is loudly accentuated. The screen reveals a dark mass which has distinct pulsation, and the skiagram (Fig. 1) shows an area of shadow, both above the heart ; these correspond very exactly with the patch of dulness found on percussion. The pulsation in the two radials is synchronous and equal. Examination of the lungs gives a distinct stridor over both sides of the chest. There is some tracheal tugging. The left vocal cord is found to be almost motionless, but it has not quite assumed the cadaveric position ; when the larynx is employed, however, in vocalisation, the right cord crosses the middle line. The pupils are similar in size, and respond to all stimuli with equal promptness.

In this case, although several of the symptoms we are accustomed to look for are absent, we cannot doubt that there is an aneurysm of the transverse portion of the arch of the aorta.[1] As rest, diet, and iodides have only produced very slight alleviation of the symptoms, the patient has been treated by subcutaneous injections of gelatin in simple serum, but even these, which the experience of my wards has taught me to rely on with considerable faith, have not been very useful. Surgical measures have been debated, and consultations have been held with one of my surgical colleagues ; on account of the position of the aneurysm, however, we have taken no active steps.

Case 2.—J. H., aged 52, miner, was sent on September 17, 1904, to Ward XXIX., by Dr. Watson, of Wemyss, complaining of pain in the upper part of the right side of the chest, and inability to lie on the left side.

The patient has marked pulsation in the second and third right intercostal spaces, close to the sternum, and also in the episternal notch ; it is unaccompanied by any thrill. The cardiac boundaries are $1\frac{1}{4}$ inches to the right, and $4\frac{1}{4}$ inches to left, of mid-sternum. Corresponding to the area of pulsation in the upper intercostal spaces there is dulness extending outwards 2 inches to the right and $1\frac{1}{2}$ inches to the left of the middle line. Save for accentuation of the second sound in the aortic area there is no change on auscultation, and both radial pulses are equal and synchronous.

[1] Since the delivery of the lecture the patient died from an infective or septic broncho-pneumonia, and an aneurysm was found in the situation indicated. The cardiac valves were in a state of absolute integrity.

PLATE XXXII.

Fig. 1. *Skiagram from Case* 1.
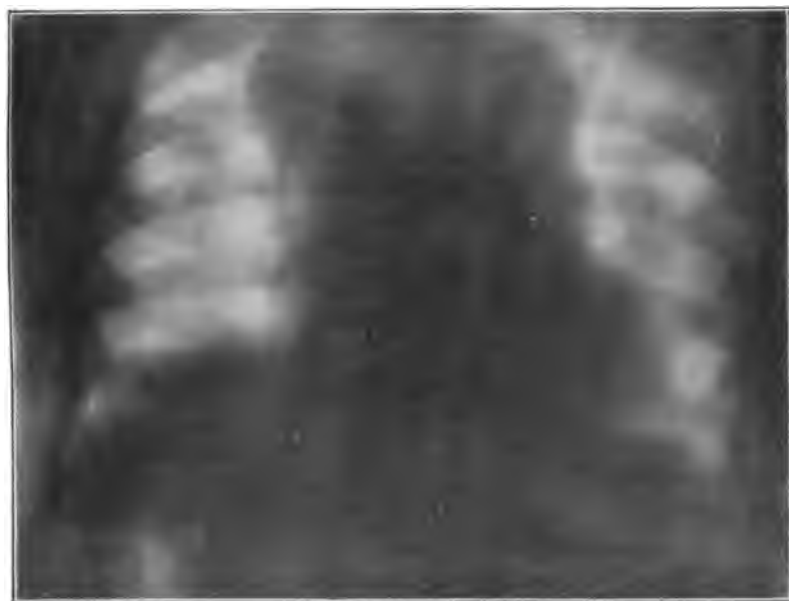
Fig. 2. *Skiagram from Case* 2.

PLATE XXXIII.
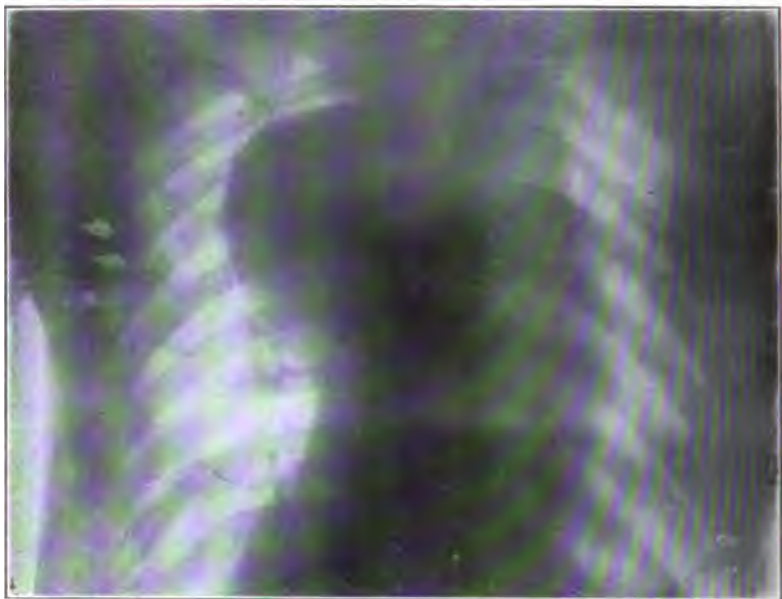
Fig. 3. *Skiagram from Case 3.*
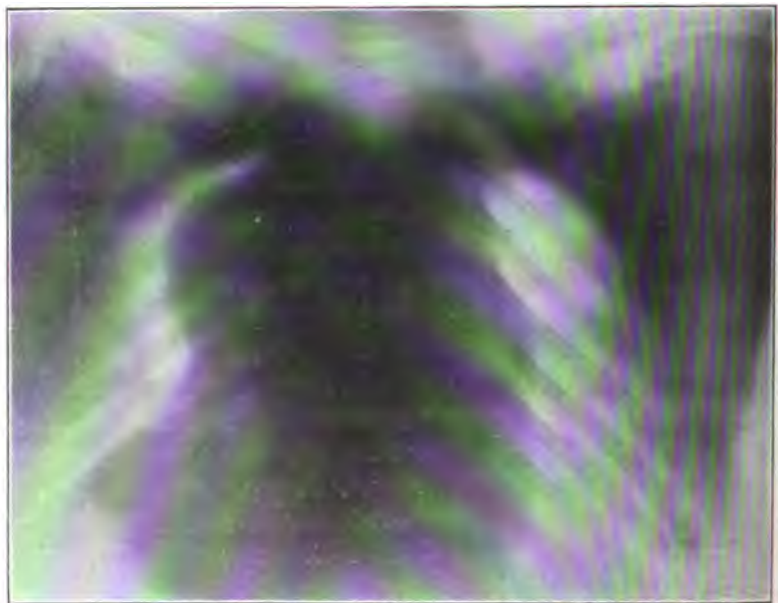
Fig. 4. *Skiagram from Case 4.*

There is no alteration of voice or of cough, and no stridor. Deglutition is unimpaired. No tracheal tugging can be felt. There is no alteration in the pupils and no vaso-motor change.

The skiagram (Fig. 2) confirms the result of observation by the screen, and the shadow above the cardiac limits shows a close correspondence with the area of dulness obtained by percussion.

In this case there is even less difficulty concluding that we have to deal with an aneurysm of the transverse portion of the arch of the aorta. The patient has greatly improved by complete rest, regulated diet, and potassium iodide, and is about to return home.

Case 3.—H. C., aged 52, hammerman, was recommended to Ward XXIX. by Dr. Henderson, Kirkcaldy, on September 14, 1904, complaining of pain in the left side of the chest and of weakness of the muscular system. Fifteen years ago certain symptoms of the kind had shown themselves after severe exertion, but five years ago the symptoms became for the first time definite.

On examination there is no swelling or pulsation beyond the præcordia, and no thrill can be felt. The cardiac boundaries are 2 inches to right, and 4½ inches to left of mid-sternum. Above the præcordia is an area of dulness occupying the first and second intercostal spaces, extending 1¾ inches to right and 2¼ inches to left of the middle line. Over this region there is no murmur—in fact, no murmur is present anywhere— but the second aortic sound is much accentuated. The skiagram (Fig. 3) shows a dark shadow corresponding to the appearance seen on the screen, as well as to the area of dulness on percussion, above the level of the heart. The radial pulses are equal and synchronous; there is no tracheal tugging, or stridor, or cough, or hoarseness, or change in pupils, or difficulty in swallowing. In this case, although with considerable absence of certain characteristic phenomena, there can be no doubt of the existence of an aneurysm of the transverse portion of the arch of the aorta. The patient has already greatly improved by the usual treatment by means of iodides, diet, and rest.

Case 4.—A. C., aged 40, shipmaster, was sent to Ward XXIX. on July 29, 1904, by my colleague Dr. Boyd, complaining of pain between the shoulders and loss of voice. These symptoms have been present for a few months.

No abnormality is seen in the form of the chest, but a slight pulsation above the level of the heart is visible. The impulse accompanying the second sound can also be felt in the aortic region. The apex beat is somewhat beyond the normal position, and the lateral boundaries of the heart are 2 and 5 inches respectively to right and left of mid-sternum. In the region of the manubrium there is an area of dulness which extends 2 inches to right and 4 inches to left of the middle line. The pulses in the radial arteries are neither equal nor quite simultaneous.

The screen shows a large pulsating shadow above the level of the heart, and the skiagram (Fig. 4) confirms this, and accords well with the results of percussion.

There is a soft aortic systolic murmur, followed by a loud booming second sound. There is no stridor in any part of the chest, but the voice is hoarse, sometimes almost absent, and the left vocal cord is absolutely paralysed. There is some tracheal tugging. Some trouble in swallowing has been experienced at times.

The diagnosis in this case presents no difficulty of any kind. The treatment has been conducted on our usual lines, but, as the patient is of a restless disposition, he has not allowed himself a favourable opportunity of improvement, and, in deference to his urgent desire, we are obliged to allow him to return to his home in the Hebrides.

Case 5.—D. F., aged 61, shepherd, was sent by Dr. Haggart, of Aberfeldy, to Ward XIX. on July 16, 1904, on account of pain in the front and back of the chest, with cough and hoarseness. The patient has some difficulty in fixing upon any definite period during which the symptoms have been present, since the onset has been very insidious. For about a year the symptoms have given him much trouble.

The patient has a harsh growling stridor, a hard brassy cough, and a hoarse monotonous voice. There is little or no dysphagia.

A distinct pulsation in the second and third right intercostal spaces, as well as in the episternal notch, arrests the eye at once on inspection. The pulsation is even more evident on palpation. There is dulness corresponding to this area of throbbing ; it extends 2½ inches to the right and 2 inches to the

left of the mid-sternal line. The lateral borders of the heart are 2½ and 5½ inches to right and left of the mesial plane. The only auscultatory change is a much accentuated aortic second sound. The radial pulses are very unequal in volume, the left being very small, but they are synchronous. There is complete paralysis of the left vocal cord, which is in the cadaveric position. The pupils show no change. No tugging of the trachea is felt.

With the screen a somewhat indistinct shadow occupies the position of the supracardiac pulsation, and the skiagram (Fig. 5) gives some indication of this.

Here, again, we have a clear case of aneurysm of the transverse portion of the arch. The treatment has been carried out on similar lines to those employed in the last three cases.

Now in these five cases we have excellent examples of aneurysm of the transverse part of the aortic arch—the " aneurysm of symptoms " as it has well been called. It will be of interest to analyse the clinical phenomena exhibited by these five cases, with a view to determine the amount of diagnostic evidence in each case. The most graphic method of presenting the facts to you is by drawing up the table which is now before you. A cross indicates the presence and a blank the absence of the different symptoms.

—	1.	2.	3.	4.	5.
Tumour in chest					
Pulsation in chest	×	×	×	×	×
Dulness	×	×	×	×	×
Murmur				×	
Radial inequality				×	×
Venous stasis					
Thoracic duct stasis					
Lung displacement					
Pressure on trachea	×				
Tracheal tugging	×			×	
Pressure on oesophagus				×	×
Pressure on recurrent laryngeal	×			×	×
Pressure on cilio-spinal					
Sensory symptoms		×	×	×	×

In this table you will observe that none of the cases shows tumour, turgescence of veins, interference with the thoracic duct, displacement of lungs, or changes in the pupils. All of them show pulsation, only one has a murmur, two have changes in the radial pulse, two pressure on the œsophagus, three paralysis of the left recurrent laryngeal nerve, two tracheal tugging, and three distinct sensory changes. None of the cases presents all, or even the majority of, the usual symptoms, direct or indirect, of the classical aneurysm of the transverse part of the aortic arch.

A word as to the skiagrams, for which my warm thanks are due to my colleagues, Dr. Dawson Turner and Dr. Hope Fowler. In all the cases the results of examination by percussion and by the use of the fluorescent screen have perfectly accorded, but in one of them—Case No. 5—the skiagram has not revealed a distinct shadow equal in size to the area of dulness. It is not easy to explain this discrepancy, but, as the patient has a considerable amount of emphysema, it is possible that dispersal of the rays may account for it.

As a contrast to these cases, let me bring before you a patient who has no aneurysm, and who yet, when under my care some time ago, presented many of the phenomena usually caused by it.

Case 6.—R. B., aged 61, engineer, was sent to Ward XXIX. by Dr. Scott, Broxburn, on May 7, 1904, complaining of pain in the chest and breathlessness, along with giddiness. His previous health had been absolutely satisfactory, except for the sudden appearance of a large inguinal hernia two years before admission, which was the result of a severe fall.

A few months before admission he suffered from pleurisy, and in March he began to cough. Dyspnœa set in soon afterwards, and the voice became husky. These symptoms steadily increased, and on admission the patient could only whisper. There was never anasarca.

He suffered from occasional præcordial pain, and frequent attacks of palpitation. This latter symptom, as well as the dyspnœa, was worse on exertion. There was some diffuse pulsation in the region of the apex, and well-marked throbbing in the epigastrium and the neck. The cardiac impulse was feeble and irregular. The heart was large, extending $2\frac{3}{4}$ inches

PLATE XXXIV.
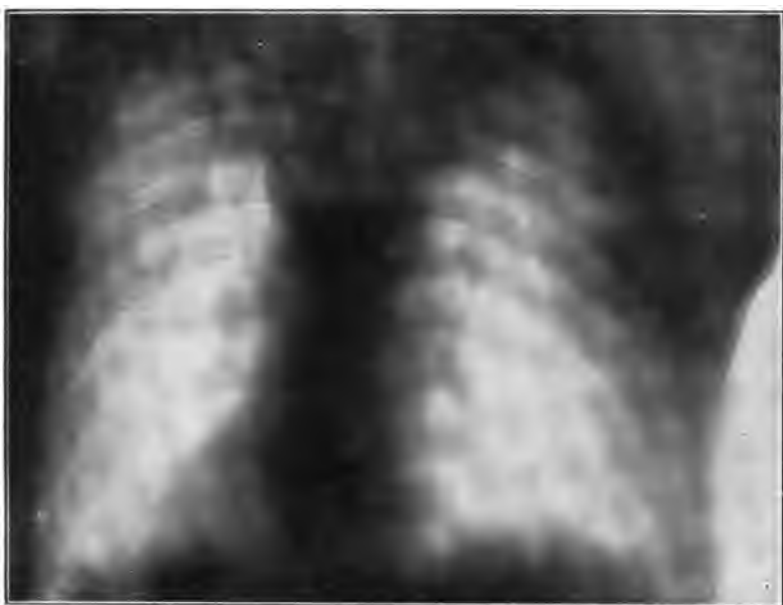
Fig. 5. *Skiagram from Case* 5.

Fig. 6. *Skiagram from Case* 6.

PLATE XXXV.
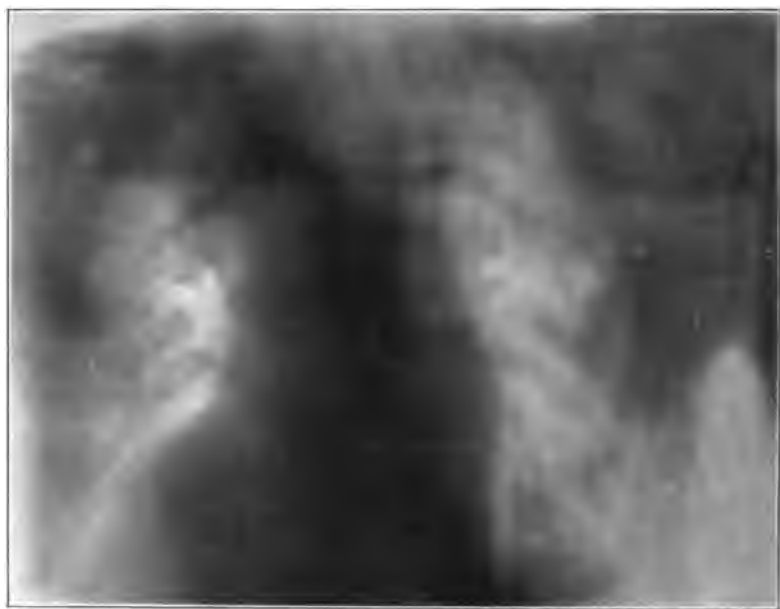
Fig. 7. *Skiagram from Case 7.*

to right and 5 inches to left of mid-sternum. There were soft-blowing systolic murmurs, of different tone, in the mitral and tricuspid areas, along with a harsher systolic murmur over the manubrium and in the carotid vessels. The second sound in the pulmonary area was very much accentuated. The arteries were thick and tortuous. The arterial pressure was rather high; the pulsation irregular and unequal; the rate varied from 80 to 90. The bases of the lungs had loud, coarse crepitations, while there were sonorous and sibilant rhonchi throughout the chest. Laryngoscopic examination revealed complete paralysis of the left vocal cord. There were no morbid appearances in connection with the urine, and no changes in the pupils.

The fluorescent screen showed no preternatural shadow, and the skiagram (Fig. 6) confirmed this.

On carefully reviewing the entire group of symptoms the diagnosis was made of chronic interstitial myocarditis with cardiac failure, from arterial changes. It seemed to me very probable that the paralysis of the left vocal cord might be caused by the large heart pressing the conus arteriosus and pulmonary artery upwards against the arch of the aorta, and thus implicating the recurrent laryngeal nerve. It must be confessed, however, that such a condition has never been under my notice before.

The treatment adopted was absolute rest, and the use of strophanthus, nux vomica, and aromatic spirit of ammonia for some days. Respiratory exercises were then commenced and gradually increased, and iodides were given to improve the arterial walls and heart muscle. Under these methods the patient rapidly improved. The dyspnœa disappeared, the voice returned, monotonous at first, but steadily increasing in compass. When he returned home he was able to sing an octave and a half, the heart extended only 1¾ inches to right and 4½ inches to left of mid-sternum, and there were no adventitious sounds over the lungs.

To-day the patient has been good enough to come into Edinburgh to show himself to you. The condition of the pulse is satisfactory. The vessel is more healthy, and the pressure moderate, while the rhythm is regular. The boundaries of the heart remain as they were when he left the ward, and

no murmur, except the aortic, is audible. The lungs are clear, the voice is not husky, and, as you can hear for yourselves, the patient can sing nearly two octaves. The left vocal cord moves as freely as its fellow.

In this case it would have been easy to make a mistake and to give a diagnosis of aneurysm. From every point of view the patient is of much interest, and if my suggestion regarding the cause of the aphonia is correct, he may be regarded as a rare example.

Finally, let me bring before you a former patient, who has been so kind as to return for your inspection.

J. E., aged 66, engine-keeper, who served in the Royal Artillery for thirteen years, and went through the Indian Mutiny, was sent to Ward XXIX. by Dr. Scott, of Broxburn, on August 9, 1900, on account of pain in the chest and back, with a choking sensation and some giddiness. Two years before admission, when pulling on a rope, the pain suddenly begun, and has never left him. Shortly before Dr. Scott sent him into the ward he had a severe attack of giddiness and agonising pain in the chest. Similar attacks recurred when he was going about, but remained absent if he stayed in bed. During the two years before admission he lost weight considerably.

There was a distinct prominence above the præcordia on the left side, and fulness of the left side of the neck, there was dilatation and tortuosity of the veins over the left side of the chest. The projection in the infra-clavicular region pulsated freely. No thrill was palpable. The cardiac boundaries were 2 inches to right and 4½ to left of mid-sternum. At the level of the manubrium there was dulness corresponding to the pulsating area, extending 3 inches to left of mid-sternum. The second sound in the aortic area was very loud and booming, and over the pulsating region there was a soft systolic murmur. The pulse showed arterial sclerosis and high pressure. There was no difference between the right and left radial pulses. No difficulty in swallowing or speaking could be elicited. The condition of lungs was intact, and the urinary system had no abnormalities.

The screen showed a dark shadow corresponding to the area of extra-cardiac pulsation, and this was confirmed by the skiagram (Fig. 7). The diagnosis was aneurysm of the trans-

verse portion of the aorta, probably with pressure on the thoracic duct.

After a long course of iodide of potassium, the patient was treated by means of injections of gelatin in simple serum. He made excellent progress in every way, and returned to his home after some months of treatment. During the last four years he has been steadily at work, and his presence to-day is simply to give me an opportunity of demonstrating to you that, while the prognosis of aneurysm as a rule is far from hopeful, we met with some cases in which excellent results occur. If my conclusion that there was pressure on the thoracic duct is correct, the interference has passed away, for the patient is now restored to his normal weight. One of the best examples of recovery from aneurysm which ever came under my notice was the subject of a clinical lecture given about ten years ago,[1] which has been frequently quoted by subsequent writers. It is to be hoped that our present patient may be equally satisfactory.

[1] *International Clinics*, Philadelphia, 1896, Series VI., Vol. II., p. 52.

THE OPERATIVE TREATMENT OF FRACTURE
OF THE PATELLA.

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[With Plates XXXVI.—XXXIX.]

THE treatment of fracture of the patella by open operation
is one of the many advances in surgery resulting from the
antiseptic treatment of wounds. It is only within compara-
tively recent years that surgeons have realised with what little
fear they may deal with disease of, or injury to, joint cavities.
Moreover, the introduction of treatment by massage and
manipulation has shown that we may expect little or no loss of
function as a result of operative interference. Even ten years
ago it was the exception rather than the rule for patellar
fractures to be submitted to operation, whereas now the
converse holds good. Prior to this advance the methods for
securing coaptation of the fragments of a fractured patella were
for the most part crude in conception and uncertain in results.
This short paper is founded on a personal experience during
the last four years of twenty-one cases of fracture of the patella
submitted to the open method of operation. My intention in
these pages is to preach the gospel of wiring every fractured
patella by this method unless some definite contra-indication
is present. Of these twenty-one cases, ten were operated on
at the London Hospital, and eleven at the Poplar Hospital for
Accidents. They were for the most part men and women in
the prime of life engaged in laborious occupations and depen-
dent entirely for their subsistence on regular and constant
work. It can readily be understood how important it is in this
class of patient to cut short the time of their imprisonment in
hospital and consequent inability to earn their daily bread. A
striking feature of these twenty-one cases treated by open
operation is the comparatively brief duration of their period of
disablement. Let us consider for one moment the time usually
spent in hospital by patients submitted to the old treatment by

strapping, extension, splinting, &c. An average period of at least six weeks was spent in bed with the leg on a splint, and this was followed by a tedious out-patient treatment for several months. Finally, at the end of six to nine months the patient was left with a partially stiff knee, and was quite unable to follow any laborious occupation. Let us contrast with this picture an average case submitted to operative treatment, and by operative treatment I mean the open method as advocated in this paper. The patient remains in bed for a period of a fortnight after operation, and for the first ten days the leg is kept on a splint. On the eleventh day the splint is discarded, and on the fourteenth day he is able to get up. He leaves the hospital at the end of three and a half weeks, and as a rule can then walk without artificial aid. In from six to eight weeks after the operation he is able to perform his usual work.

There are still surgeons at the present time who maintain that there is no indication for operative interference in the ordinary case of patellar fracture. They argue that an open or even subcutaneous operation involves a considerable risk, and does not produce better results. I admit, for the sake of argument, that in the small minority of cases, with but slight separation of fragments, good fibrous union may be obtained. Further, that after a long tedious period of rest and splinting an apparently useful joint may follow ; but I maintain that this is a position of false security. As time goes on, the bones tend gradually to separate, leading to a condition of instability, and finally the condition of the joint unfits its owner for any occupation entailing severe muscular effort. A good example of this came under my notice at the Seamen's Hospital, Greenwich, in 1900. The case was one of simple fracture of the patella, treated by the old method of splinting and fixation. He came under my care twenty-five years after the original accident. The radiograph (Fig. 1) shows what an extraordinary distance intervenes between the two fragments of the bone. In the position of full flexion there was an interval of 6 inches between the upper and lower fragments. The quadriceps was markedly wasted. As a result of this separation the power of extension of the limb was reduced to a minimum. The accompanying photograph (Fig. 1A) shows the limb in its fullest possible degree of extension. The patient was quite

unable to ascend any elevation, and even the power of walking on the flat was much impaired. Such a condition mnst be regarded as surgically lamentable ; moreover, there would appear to be no safeguard against a similar result in any cases of fibrous union of a fractured patella. Now, since fibrous union is the usual result obtained by non-operative measures, it seems logical to conclude that a permanently disabled joint may be a not uncommon sequel.

No one can deny that even at the present time there is a certain risk of sepsis resulting from an operation of this nature. If, however, the conditions are favourable, the risk in competent hands should be reduced to a negligible quantity.

The main argument I claim for the operative method of treatment are :—

1. That the loss of time consequent upon the receipt of the injury is enormously reduced. A clear gain of about six months can be reckoned on in an average case.
2. That the operation ensures sound bony union with a perfect functional result.

The fragments of the fractured patella may be wired or sutured together either by the open or by the subcutaneous operation. By one subcutaneous method the wires are passed round the fragments, and the ends twisted together over a pad so as to be entirely external to the skin (Kocher's method).

The advocates of this line of treatment maintain that the risk of sepsis is thus reduced to a minimum, and that good union and function result.

The arguments against such a method of treatment are :—

1. The wires are not permanent ; they have to be taken out after three or four weeks.
2. *Early* passive movements cannot be thoroughly carried out.
3. The fractured surfaces of the fragments cannot be satisfactorily freshened.
4. The blood and effusion in the joint remain untouched.
5. The torn tendinous expansions ot the vasti are left untreated.
6. An exact coaptation of the fractured surfaces is out of the question, the common tilting of the lower fragment remaining partially uncorrected,

PLATE XXXVI.

Fig. 1. *Extreme separation of fragments as a late result of fibrous union.*

Fig. 1A. *Shows limitation of extension power due to wide separation of fragments.*

PLATE XXXVII.

Fig. 2. Shows the tilting of the lower fragment ; the fractured surface faces directly upwards.

Fig. 3. Fractured patella treated by Kocher's method. Note the uncorrected tilting of the lower fragmen'.

Radiograph Fig. 2 illustrates the tilting in the lower fragment.

Radiograph Fig. 3 shows the same tilting still uncorrected after treatment by Kocher's method.

By Barker's well-known method, sutures of stout silk or kangaroo tendon are passed round the fragments so as to lie entirely beneath the skin. The sutures are not subsequently removed.

In some cases, no doubt, bony union takes place. I am sure that this is the best form of subcutaneous operation ; but consider that it is not free from some of the objections which have been already urged against Kocher's method.

The open method of treatment of fractures of the patella consists in :—

(*a*) Exposing the fragments by an incision which may be vertical, transverse, or semilunar.

(*b*) Emptying the joint of blood clot, serum, and torn tissue.

(*c*) Freshening the surfaces of the fragments.

(*d*) Passing the wires through holes bored by a drill.

(*e*) Suturing the lateral tears in the expansions of the quadriceps.

All my cases were operated on by this method.

I find that a semilunar incision gives the best view of the fragments and joint cavity. I do not think the vertical incision a satisfactory one. It limits the field of operation, so that it is very difficult to pass two wires through the fragments, the tears in the expansions of the quadriceps cannot be easily reached, and, further, the scar lies directly over the buried wire. I am sure that it is advisable to pass two wires, if possible, in every case. The early manipulations of the joint after operation throw too much strain on a single wire and on one part of the bone. In two of my cases I had to re-wire a patella in which one wire had previously been inserted, this wire having broken some little time after operation owing to a strain. It has been stated that the wires eventually cause irritation, and have to be removed. This, I think, must be a rare occurrence ; in my series it has not taken place. I have heard that occasionally the ends of the wires become untwisted, and fret the skin. I believe that

this is entirely due to faulty twisting, one wire having been rotated round the other instead of both ends being equally rotated. Even if irritation does occur, it is a simple matter to take out the wire, and usually by this time sound bony union will have been assured. I attach importance to the careful suturing of the lateral expansions of the torn quadriceps. I believe that the vasti are mainly responsible for carrying out full extension of the leg, and are in this action more powerful than the rectus or crureus.

Case No. 2 in my series illustrates in a remarkable way to what extent the vasti are responsible for this power of extension of the leg.

Mrs. H., aged 30, whose left patella I had wired two years previously, came to the Poplar Hospital in March 1904, with an untreated fracture of the right patella of 12 months' duration. At the operation it was found necessary to divide the rectus and crureus transversely bit by bit before the fragments could be approximated. An interval of 4½ inches had separated the fragments before operation. After wiring the bones the lateral expansions were carefully sutured, but the divided rectus and crureus were left untouched. In spite of this, she has regained a useful limb with perfect power of extension (*vide* photograph Fig. 4).

Radiograph Fig. 5 shows the fragments wired together.

I need hardly say that in simple stellate fractures with but slight displacement there is no need for operative treatment. On the other hand, in comminuted or compound fractures, operative treatment by wiring or suturing the fragments by silk or kangaroo tendon will give best results.

Case No. 7 is a good example of a severe compound comminuted fracture of the patella by direct violence. The patient fell from a ladder, and in his fall struck his left knee on a ledge. He was admitted into the hospital with a lacerated wound of the front of the patella. The bone was felt to be extensively fractured. Under anæsthesia the wound was opened up, and no less than nine different-sized fragments of the bone were removed. These were lying free and stripped of aponeurosis. Two stout silk sutures were passed round the two remaining fragments, through the ligamentum patellæ below and quadriceps above. Some slight suppuration in the original wound

PLATE XXXVIII.

Fig. 4. *Shows complete recovery of extension power after operation in an old untreated fracture with* 4½ *inches separation.* Vide *Case 2*.

Fig. 5. *Shows wired fragments in position.* Vide *Case 2*.

PLATE XXXIX.

Fig. 6. *Shows bony union in severe comminuted fracture of patella. Fragments united by kangaroo tendon. Note horizontal fracture in lower fragment.* Vide *Case* 12.

Fig. 7. *Amount of flexion obtained* 18 *days after operation.* Vide *Case* 14.

took place, but fortunately this did not involve the joint cavity. The patient left the hospital able to walk, but with a stiff knee. Twelve months later union appeared to be quite firm, although the power of flexion was but small.

Radiograph Fig. 6 shows the result obtained in Case 12. In this patient a simple comminuted fracture resulted from direct injury. There were four fragments altogether, a large upper piece attached to the quadriceps, and three smaller ones connected with the ligamentum patellæ. The larger of these three pieces had been completely split horizontally. As it was impossible to unite the fragments by wires, two kangaroo tendon sutures were employed. The radiograph shows apparently sound bony union.

Photograph Fig. 7 illustrates the amount of flexion regained 18 days after operation in case No. 14.

I do not think it necessary to wire these fractures immediately on their admission into hospital. If there be much bruising or effusion in the joint, I prefer to wait for a few days.

As to the actual technique of the operation, I have in nearly every case used an electric drill to bore the holes, and found it of great advantage. In all but two cases a silver wire of medium thickness was used.

In Cases No. 12 and No. 7 kangaroo tendon and silk were employed. Catgut was used to repair the tears in the lateral expansions. The joints were in no case irrigated with saline fluid, as recommended by some surgeons, but the blood clot and serum were in each case mopped out with sterilised gauze. Two small drainage tubes were left in for 48 hours in every case.

I particularly wish to emphasise in this paper the great importance of starting massage and passive movement of the affected joint at the earliest possible time after the operation. In the majority of my patients this treatment was commenced after 12 days, in fact as soon as the wound had sufficiently healed. The amount of passive movement is increased daily. The patient is allowed to get up about 14 days after operation, and is then encouraged to swing the leg from the knee and move it as much as possible. Some slight pain is caused by the early manipulations. In the average case no support for the knee is necessary.

An analysis of my cases shows the following points :—

1. *Time in Hospital.*

In seventeen cases the average stay in hospital after the operation was twenty-three and a half days.

Sixteen of these patients were able to walk out of the hospital without any support, with the power of flexion of the knee to a right angle.

One case of operation for re-fracture resulted in a stiff joint (*vide* Case No. 13).

Four cases were kept in hospital for a more prolonged period. These were as follows :—

(i.) *Case No.* 12.—Suppuration in the knee-joint, followed by disorganisation and ultimately amputation of the leg.

(ii.) *Case No.* 5.—Recurring synovitis in the knee after passive movement ; this patient was a markedly alcoholic subject.

(iii.) *Case No.* 2.—Operation for an old untreated fracture with wide separation.

(iv.) *Case No.* 13.—A simple comminuted fracture united by kangaroo tendon sutures.

2. *Occurrence of Sepsis.*

I regret that in one case, viz., No. 12, an infection of the knee-joint led to a disastrous result. It is a curious fact that this was the only occasion on which I operated in sterilised rubber gloves.

In Case No. 13 an effusion of blood serum had to be evacuated later under anæsthesia.

In Case No. 7 slight superficial suppuration followed in a lacerated wound received at the time of the accident.

In all the other cases healing by first intention took place.

Additional Points of Interest.

In no less than four out of my twenty-one cases a fracture had occurred on both sides. In three of these the patella first fractured had not been treated by operation.

In two of my cases re-fracture had occurred after the bone had been wired. In these two a single wire had been employed.

Case.	Name, Age, &c.	Abstract of Hospital Notes.	Time in Hospital.	Result on Discharge.	Later Result.
1	M.H., female, 30, Poplar Hospital, March 1902.	Left patella, transverse fracture. In-direct violence. Operation, two silver wires inserted. First intention.	21 days	Can walk without sup-port. Flexion to an acute angle. Exten-sion complete.	March 1905, perfect result.
2	M.H., female, 32, Poplar Hospital, March 1904, *Vide supra.*	Readmitted for fracture of right patella. Accident 12 months ago, untreated. Transverse fracture, fragments 4½ inches apart. Wasting of quadriceps. Power of extension slight. Operation, rectus and crureus divided, upper frag-ments pulled down, two wires inserted.	10 weeks	Power of extension little improved. Flexion very slight.	December 1904, has com-pletely regained the power of extension. Can flex the knee to a right angle. *Vide* photograph.
3	M.H., female, 46, Poplar Hospital, August 1901.	Left patella, transverse fracture. In-direct violence. Operation, two wires inserted. First intention.	3½ weeks	Can walk without sup-port. Can flex knee to a right angle.	February 1905, knee perfect.
4	T.L., male, 43, Poplar Hospital, December 1903.	Right patella, transverse fracture. In-direct violence. Wide separation of fragments. Operation, two wires in-serted. First intention	23 days	Can flex the knee to a right angle.	December 1904, movements of joint perfect. Has occasional aching pains in joint. No effusion.
5	S.S., female, 35, Poplar Hospital, May 1901.	Has old fracture left patella, not wired, 3-inch separation of fragments. Exten-sion power nil. Right patella recent transverse fracture, wide separation. Operation on right patella, two wires inserted. First intention, Traumatic synovitis after passive movement, Tedious recovery. An alcoholic sub-ject.	10 weeks	Can walk fairly well. Can flex to 120 degrees.	Cannot be traced.

Case.	Name, Age, &c.	Abstract of Hospital Notes.	Time in Hospital.	Result on Discharge.	Later Result.
6	E.L., male, 22, Poplar Hospital, July 1901.	Left patella, transverse fracture. Indirect violence. Operation, two wires inserted. First intention.	3½ weeks	Can walk without support. Power of flexion and extension nearly complete	Cannot be traced.
7	A.C., male, 30, Poplar Hospital, April 1903.	Compound comminuted fracture, left patella. Direct violence. Operation, nine pieces of loose bone removed. Two silk ligatures passed round remaining fragments. Healed up, but small sinus persisted. Ligatures removed three months later.	4½ weeks	Wound not quite healed. Knee stiff.	April 1904, soundly healed. Fragments of patella apparently firmly united. Slight flexion obtained.
8	G.E., male, 44, Poplar Hospital, December 1903.	Refracture of right patella. Fracture 12 months ago, not wired, treated by splinting and extension. Knee nearly stiff since. Operation, two wires inserted. First intention.	18 days	Can flex knee to an acute angle, can walk well.	November 1904, perfect result.
9	H.M., male, 36, Poplar Hospital, July 1904.	Right patella. Indirect violence. Transverse fracture. Operation, two wires inserted. First intention.	3½ weeks	Can walk well, flexion to an acute angle. Went to work 5½ weeks after operation.	December 10, 1904, movements perfect.
10	E.G., female, 42, Poplar Hospital, October 1904.	Left patella, transverse fracture. Operation, two wires inserted. First intention.	23 days	Flexion to right angle.	February 14, 1905, movements perfect.
11	T.M., male, 41, Poplar Hospital, February 1905.	Right transverse fracture. Indirect violence. Operation, two wires inserted. First intention.	3½ weeks	Can flex knee to a right angle. Can walk well.	—

12	N.L., male, 37, London Hospital.	Comminuted fracture right patella. Direct violence. Operation, joint opened up, patella found in four pieces, the largest of the three lower fragments was split horizontally. Two kangaroo tendon sutures passed round the fragments. Slight stitch suppuration. Healed up well.	7½ weeks	Union sound. Can flex knee to a right angle. Can walk well without support.	February 1905, can flex knee to an acute angle, extension perfect. Can mount a stool with right leg. See radiographic print.
13	T.W., male, 49, London Hospital, December 1902.	Refracture left patella. Had been previously wired with one wire. Knee stiff, wire broken in attempting movement under anæsthetic. Operation. First intention, two wires inserted.	5 weeks	Knee practically stiff -	Knee stiff, bones firmly united, wires not felt.
14	J.M., male, 38, London Hospital, October 1904.	Right patella, transverse fracture. Indirect violence. Operation, two wires inserted. First intention.	19 days	Can flex to right angle. Went to work 5 weeks after operation.	February 1905, some chronic effusion in joint, no pain, movement perfect.
15	W.S., male, 37, London Hospital, April 1903.	Right patella, transverse fracture. Indirect violence. Operation, two wires inserted. First intention.	27 days	Can walk well. Can flex knee to a right angle	Cannot be traced
16	E.M., male, 27, London Hospital, August 1903.	Right patella, refracture. Was wired with a single wire in South Africa, January 1903. Operation, fragments of single wire removed, two wires inserted. First intention.	25 days	Can flex knee to an acute angle. Can walk well.	Cannot be traced.
17	A.B., female, 32, London Hospital, March 1903.	Left patella, transverse fracture. Direct violence. Operation, two wires inserted. First intention.	24 days	Can flex knee to a right angle. Walks well.	Cannot be traced.

Case	Name, Age, &c.	Abstract of Hospital Notes.	Time in Hospital.	Result on Discharge.	Later Result.
18	T.H., male, 63, London Hospital, March 1904.	Right patella, transverse fracture. (N.B. Had fractured the left patella 6 years ago, not wired.) Operation, two wires inserted. First intention.	25 days	Can walk well. Flexion to a right angle.	Two months after leaving hospital fell down in the street and refractured the right patella. Taken to country hospital, wires removed and one inserted. Seen by me February 1905. Power of flexion very slight. Bone feels soundly united. Wears an instrument.
19	A.L., male, 23, London Hospital, October 1904.	Right patella, transverse fracture. Indirect violence. Operation, two wires inserted. First intention.	23 days	Can walk well. Can flex knee to 120 degrees.	March 4, 1905, can flex knee to right angle. Can work well. Can run up and down a ladder.
20	W.E., female, 31, London Hospital, September 1902.	Right patella, transverse fracture. Indirect violence. Operation, two wires inserted. Suppuration on 7th day. Wires removed 3 months later and joint laid open. Two months later, amputation of thigh between lower and middle thirds. Suppuration. Finally healed up.	7 months	—	—
21	W.K., male, 33, London Hospital, October 1904.	Right patella, transverse fracture. Indirect violence. Fractured left patella 13 years ago. Not operated upon. Operation right leg, two wires inserted. First intention.	23 days	Can walk well. Can flex knee to a right angle.	March 1905, doctor writes as follows:—Patella solid, no fissure. Flexion of joint to an acute angle. Can walk any distance and run fairly well.

FUNCTIONAL INSANITY.

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IT requires courage, if not daring, to advance at this stage of neurological research and knowledge, the view that many of the morbid mental conditions known as insanity are functional, and that therefore there are diseases of function as well as of organs. I expect this theory to meet with much adverse criticism, possibly with a severe rebuff. For these I am prepared, but to avoid misapprehension I request permission at the outset to define my terms, always a risky procedure, for it is said that, by defining, one erects an idol with special qualities, which invites by these qualities its own destruction. Definition is, however a convenience, for only by this means can we group allied symptoms, note their relations, and sum up our knowledge.

By function we mean the work done by, or the action of, any organ or set of organs, and among these organs we include the "independent protoplasmic unit," the neurone. The work of these neurones varies in quality and intensity. Their energy can vary with a suddenness which appears to preclude any organic change. We know, and it is proved both by experience and disease, that the various organs of the body receive their direction, tone and support through the neurones from the central nervous system, and although we are accustomed in disease to find structural alterations, which account for the morbid phenomena, yet nature may, on occasions, experiment in so subtle, fine and obscure a manner as to alter the function, without leaving any evidence of definite or appreciable change in structure. We meet with both men and women at all ages, whose lives are a misery to themselves and a cause of distress to their relations, who suffer from perverted sensations or anæsthesias, paræsthesias, and dysæsthesias, from pains or algesias, from loss of power or paresis, from various affections of the sense organs and even from mental abnormalities, yet who have no discoverable nervous lesions to account for these

symptoms, and whose lowered vitality and consequent incapa-
city can only be described as "functional."

These functional diseases, also termed dynamic or vital as
opposed to those of a physical or material character, are in
contradistinction to organic or lesional diseases. We are
acquainted, for instance, with tumultuous cardiac disturbances
following upon a shock of surprise, or associated with emotions
of fear; with respiratory disturbances familiarly described as
"taking the breath away" after startling sensations. We find
albuminuria without disease of the kidneys, and mental perver-
sion accompanying bodily disorders without any definite
structural brain disease. The mental irritability and the
impulsiveness of cardiac (more especially of aortic) disease, the
buoyancy and the hopefulness, evidenced in cases of tubercular
phthisis, and the different mental states accompanying digestive
troubles or disorders of nutrition are so well known that the
maxim "the stomach rules the world" is a true word spoken
in jest. I need but refer to the mental states associated with
gout, and other metabolic changes, to emphasise my theory
that there are many and varied mental abnormalities without
definite structural brain lesions, *i.e.,* that there are diseases of
function as well as diseases of organs.

As to the term insanity, this is not in itself a disease, but a
symptom which may be due to many different morbid con-
ditions. It has been defined negatively as a condition opposed
to sanity, and this is the view we shall adopt as being suffi-
ciently comprehensive to include every variety. We know
that the standard of mental health is a variable one, so much
so, that one may safely say that nobody is always sane. The
age of the individual, the period in which he lives, and the
class of society to which he belongs, all have to be considered.
There is a different standard of mental health, as possibly there
is of honour and morality, and certainly of custom and social
usage, for each class of society and in each social *stratum,*
and, therefore, so many different degrees of insanity; so
that insanity becomes a want of conformity with an artificial
code. We know, however, that the social regenerator, the
man of genius, the statesman, and the poet are all out of
harmony with their surroundings, yet the term insanity can
hardly be taken to describe their mental life. Moreover, the

criminal, the pessimist, nay, even the ambitious man, may each be out of harmony with his environment, but yet not insane. Of all the symptoms of insanity, possibly the presence of illusions and hallucinations which delusions corroborate, are the chief indications, because these form the basis of acts, and it is conduct in the last resort which is the keystone, upon which a judgment rests as to what constitutes sanity or insanity. It may be pointed out, however, that there are probably many hundreds of men and women who suffer from no legal disability or social ban owing to the presence of illusions, hallucinations, or delusions. They fulfil all their obligations to themselves and to society, and their idiosyncrasies are tolerated. When, however, abnormal conduct passes a limit fixed for that particular class of society, considerations of expediency decide that the person should be segregated ; he is then certified, and henceforth becomes an official lunatic, and his insanity a recognised aberration. I venture to think that many of these cases in their early stages are functional. It is well known to those, with large experience of mental diseases, that all the symptoms of insanity may be present in disordered conditions of health, and cases are received into asylums, which are not true organic insanity, but the delirium of febrile diseases, where illusions, hallucinations, and delusions were temporary, and due only to disordered nutrition. I have seen cases of scarlet fever, typhoid, and pneumonia in whom the mental symptoms so preponderated that the patients were certified and admitted into an asylum as alleged lunatics, in whom the illusions, hallucinations, or delusions were only the temporary delirium of febrile states resulting from disordered nutrition. Furthermore, in regard to the question of insanity, the symptoms may be repressed at the instance of the individual patient, who is able to inhibit the undue prominence of delusions, or of any one striking content of consciousness, which again indicates that there is an absence of structural or organic lesions. It will be seen that we do not only deal with legal insanity—which is a formal and artificial aspect—but that the term insanity is to us a wider and a more comprehensive one, being taken to include all mental conditions which are opposed to sanity.

What has the pathologist to say to us about insanity ? If

we except definite lesions accompanying paretic and other forms of dementia, certain neuronic and other changes in acute delirium, and the deficiency of brain development in idiocy and imbecility, there is no pathology of insanity. There are innumerable mental states for which there are no definitely discovered or ascertained physical conditions, and there are many mental abnormalities in which both microscopical examination, and the comparison of appearances observed after death with the symptoms recorded during life, fail to discover any morbid states in the brain underlying this mental derangement. In many cases of insanity the most delicate electrical apparatus, the test tube, the ophthalmoscope, the sphygmometer, and the microscope, in the hands of able, earnest, and competent observers and investigators, have all failed to recognise any disease in the physical substratum of mind, and observers have been content, in the absence of definite lesions, to describe mental abnormalities as "disease manifestations," but not disease, *i.e.*, that the mental states or conditions are functional, and not due to structural or organic changes. It is open to objection that the absence of observable lesions is not definitive, that failure to observe them is due to insufficiency of the means of investigation at our command, and that the further investigations are directed the fewer become the number of functional diseases. It is accepted, however, that, up to the present, many nervous disorders have attributed to them, as facts of causation, conditions such as are employed in the terms "defective or disordered cerebral innervation," phrases which, although somewhat vague, may yet probably harmonise with the facts better than any others hitherto advanced. Ferrier, Horsley, Waller, Sherrington, and other great physiological workers have thrown much light upon the energy set free in nervous centres. Horsley has detailed methods of estimating the amount of energy developed in the nervous centres themselves, by quantitative measurements of phenomena correlative to nerve energy, and Mosso has endeavoured to draw conclusions in regard to nerve energy, by measuring the physical effects directly produced by its activity. In spite of these researches, however, we know little more than the rate of transmission or the rate of progress of nervous energy along a nerve. What the actual energy may be is still vaguely described as "motion

liberated by molecular change," *i.e.*, by chemical or electrical changes in the highly specialised nervous structures, a position scarcely advanced beyond the description of Newton, that nervous energy was "a vibratory disturbance of the particles of the nervous system." Possibly all actions of nerve elements in the brain are a chemical change, the molecules breaking up into lower compounds. We know little about nerve force, but we do know, by their sensitive reaction to toxic agents, that the higher nerve structures are exceedingly delicate, that they are readily excited and readily inhibited, showing a condition of sensitive equilibrium, which is demonstrated by the disturbances of muscular action, so characteristically associated with the mental erethism of acute insanity. Let us briefly consider the physiology of these nerve structures. When that part of the cortex, anterior to the fissure of Rolando, is electrically stimulated, co-ordinated, and not individual, muscular contraction results—the contractions being with the object of accomplishing some definite movement. An irritative cortical lesion here will cause clonic convulsions, and, if circumscribed, then convulsions occur in definite groups of muscles, as is observed in Jacksonian epilepsy. A destructive lesion in the same area of the brain will cause paralysis of the same group of muscles, but the paralysis is of the spastic type, which shows that the contractility of the muscles, maintained by the lower motor neurons in the cord, is exalted, either by removing the restraining influence of the cortical set, or by irritating the lower through the degeneration of this higher group.

With regard to tactile sensation, the researches of Sherrington, Campbell, Bolton, and others show that these afferent sensations arrive in the cortex of the parietal lobe by way of the optic thalamus—which probably modifies impulses from the periphery—and are closely related to the efferent motor discharges. Tactile sensation is the most general and universal source of knowledge of the environment in the vertebrata, and it is this region, possibly the "kinæsthetic area" which is affected in sensori-motor disturbances, and gives the individual his personality. As to the neurone, its body not improbably exercises a trophic influence over the neuraxon, which also in turn exercises some temporary influence upon the cell body, whereas the protoplasmic dendrites, by their arborizations with

axis cylinder collaterals, and by their extensive branchings over minute blood vessels, are both centripetal organs for collecting nervous impulses, and nutritive channels for the supply of food material. We know the effect of most poisons to be upon the nutritive substance of these neurones, and, with the possible exception of the tetanus toxin, not to be upon the nerve fibrils or stereoplasm of these cells. We know little of the cortical areas other than those which are sensory or motor or both, and which are described as " kinæsthetic," and possibly two-thirds of the human cortex is concerned neither with motion nor sensation, and it is this portion of it which differentiates man from other vertebrates. This remaining portion has been described by Flechsig as the great association areas. It is said to be concerned with judgment, comparison, believing, and originating actions, and to be functionally the highest area, involving the most complex intellectual processes. This region physiologically is, therefore, the most highly developed, the least organised, and the most complex of all the cortical areas, and, in consequence, the most likely to be disturbed by adverse stress.

In considering functional mental diseases, one cannot but be struck with the different reaction to stress of individuals in different families. We know of some families with suicidal impulses, in which mental depression caused the suicide of grandfather, father, and son each in his turn at corresponding ages. Of all forms of mental affection that associated with suicide is the most often inherited, and of 1,708 males under my care, suicidal tendencies occurred in 27 per cent. In 200 of these latter, a direct history of ancestral insanity was noted in 43 per cent., and a collateral one in 27 per cent. We meet with an epileptic parent with more than one insane child. I have had under my care, in an asylum, a father, and at different times five of his children, and it is quite common to meet with father and son or sons suffering from insanity in the same asylum. Also, insanity appears to have hereditary equivalents; for epilepsy, hysteria, hypochondriasis, chorea, alcoholism, and crime may appear interchangeably in the descendants of insane parents. Even genius, which is a departure from the normal type, is not infrequently met with among relations from an insane stock. Not a few are inventors

and patentees among the patients in city asylums or among their relatives. In no department of medicine is the question of family inheritance more marked than in the practice of nervous diseases, and it is not ideas or diseases themselves that are transmitted, as we see by the interchangeable equivalents already referred to, but a " tendency " or a natural proclivity to nutritional disturbances, and manifested mainly at one or other of the important periods of life, when a strain or a stress, habitual to the stable person, may in those, with family histories of insanity, cause a mental breakdown. Man is an agglomeration of organs, and the healthy life of man is the harmonious co-operation of all these dissected elements, each of which in health contributes to the total well-being, each also being capable of resisting disintegration through adverse circumstances, according to its own special stability, and this tendency is familiar in the practice of all hospital physicians, who observe the tendency to nutritional disturbances in other organs, such as the kidney, or in groups of organs, such as these with cardovascular affections, and also by the appearance of malignant disease passed on, so to speak, from parent to offspring.

Now, mental reaction greatly depends upon the character of the different stimuli brought to the cortex from the various sense organs, and it is interesting to note that the sense of smell (the least informing to man in regard to the external world) is phylogenetically the oldest, being most highly developed in the lower vertebrata ; some fishes, for instance, having, as Dr. G. A. Watson has shown, relatively the greatest central representation for it. This sense is therefore the most organised, and it is rare for the sense of smell, or even taste, which also gives little knowledge of the external world, to be affected in insanity. The two senses, which supply man with means of communication by speech, writing, and reading, are sight and hearing ; together they are pre-eminently intellectual, they are exact and analytic, and are on a higher plane in man than are any of his other senses, but they are the most frequent to be disturbed in cases of highly evolved insanity. Touch, the most general of the senses, is less intellectual than either sight or hearing, but is the one most commonly disturbed in that "lower level" form of insanity, associated with hysteria, to which we shall again refer. As to the senses, illusions

form a common psychic phenomenon in insanity, and it is doubtful—unless they are unilateral—if mental illusions are ever peripheral. Both illusions and hallucinations may be physiological, that is, they may be temporary in their duration, or they may come and go. We meet with cases of insanity in whom these perversions are not constant ; there are periods during which those who suffer from them are suddenly quite free and remain so for indefinite intervals, a condition which suggests that the fundamental process is nutritional and functional ; possibly the fine dendritic processes of the neurones are temporarily disturbed, as they are known to be in cases of injury, when mental unsoundness is characterised by loss of memory of the accident, but which ends in complete recovery. It is a short step from illusions and hallucinations to delusions, which are ideas conceived upon false sensory impressions or perceptions. We are familiar with deceptive impressions produced by diplopia, scotomata, photopsia, disease of the peripheral nerves and entotic sounds of various character, all of which may be due to nutritional disturbances, and none of which can be considered to be insanity. Delusive ideas like hysteria with contractures may, in time, be accompanied by organic changes, but in their early stages they are more often functional, for other associations may grow and eject them. It is the consequence of delusions, rather than their cause, which makes them pathological, and it is their projection outwards, which eventually causes them to be regarded as insane delusions. So long as we are dealing with the external world, our facts of causation are simple and apparent, but when we pass to ideas—questions relating to "self"—we are face to face with "consciousness," and we are unable to analyse either the consciousness of others, or what have been described as our own "unconscious physiological processes"— conditions often referred to in hysteria. We can only state that the causes thereof appear to be physical phenomena. Even what the various elements of mind may be, we do not know, but we can relate the different ways in which consciousness may refer to an object, viz., as being pleased with it, desiring it, and remembering it. We do know, however, that the various elements, implied in cognition and feeling, when displayed in correct association and under proper control,

do give us healthy mental reaction. When these are impaired, or their combination is affected, then the prominence given to any one factor possibly implicates all the others, and illusions, hallucinations, or delusions result.

The delusions met with in insanity—whether functional or organic—are as various as the manifestations of human thought, and we can only say, in regard to them, that some stimulus probably excites a group of cortical neurones, and a kind of " intercellular tetanus " gives rise to a play of ideas, which, when the excitations are transferred to motor fibres, are associated with action. In health the steady current of nerve force flows evenly from centre to centre, and there is equilibrium between the various groups of cortical neurones, the stream of nerve force also flows down the pyramidal tracts, and controls the spinal centres, keeping the muscles in a state of healthy tone. All the neurones are probably in a high state of chemical tension, and any nutritional disturbance means explosion followed by exhaustion, a condition which we possibly find in all functional diseases.

What is the characteristic feature of functional diseases, and what are the forms of mental abnormalities which come under this description ? Speaking generally, we are correct in stating that functional diseases are characterised by their lesser duration, their slight and transitory character, and their recovery.

It is not improbable that hysteria is at the root of most of the mental conditions in women that come under the observation of the asylum physician. It is as definitely related to mania in women, as hypochondriasis is to melancholia in men, and both are conditions pre-eminently functional in their pathology. Hysteria may be looked upon as a temporary sensori-motor disturbance with a psychosis, and the sensory disturbances of hysteria indicate that there is a participation of centres lower than those connected with mental symptoms. Hysteria is, as suggested by Mercier, a " lower level " form of insanity, which to some extent is under the control of the higher centres ; whereas insanity is an affection of the highest levels, and therefore a disturbance of the highest intellectual processes themselves. The greater number of women, admitted into asylums during the adolescent period of life, suffer from

insanity of a transitory type, as is evidenced by the fact that of the women, admitted under the age of 25 years into the London asylums during 1903, 53 per cent. were discharged recovered, whereas the recovery rate, based upon all ages, was only 34 per cent. This type of insanity is often dependent upon anomalies of health, such as anæmia, amenorrhœa, simple exhaustion, the strain of modern life, and disturbances of the emotions, and it passes off with improvement in the general health. There is no definite hysterical psychosis, although most of these cases are exceedingly unstable and sudden in their mental reactions, which is shown by their capriciousness, irritability, and sentimentality ; being at one moment joyous, at another sad and tearful, but without obvious reasons for the change. In the intervals between hysterical attacks they are bright, intelligent, and cheerful. These cases are always exceedingly responsive to suggestion, and the various forms of paralysis they suffer from are either assumed by suggestibility, or they recover by suggestion or diversion, the treatment referred to as " asylum treatment " and implying a change of function. There is often a loss of memory which renders hysterical patients self-contradictory, but the amnesia is not limited to ideas, there is amnesia of the " kinæsthetic" elements as well. There is no recollection of the movements of a limb, showing that the sense of muscular impressions— probably registered in the Rolandic area—is functionally in abeyance, the various movements with their images fail to be preserved and reproduced owing to the functional disturbances giving rise to a condition called " kinæsthetic anæsthesia." Amnesia in these cases may be so marked that all past events in their life may be completely deleted, their memory only returning with or after another paroxysm. Such cases are rare, but a classical description is given of sudden transformation by Dr. Albert Wilson in his record of a case of double consciousness or dual personality. These occurrences quite justify the definition of hysteria as a " disintegration " of the personality. The weakening of will power is a distinct feature in these cases, many women being quite unable to carry on their ordinary avocations and having no power even to answer questions. The prominence of the sensori-motor disturbances gives rise to vociferous singing, laughing, and dancing, or the

patients in their excitement break windows, tear clothing, shout, scream, and behave extravagantly, which indeed most frequently results in their being brought under asylum treatment. These seizures, followed by lethargy, together with the mental state, have caused such cases to be mistaken for epilepsy, and I have received cases, in which the seizures and symptoms were described as due to this cause, but which were really cases of hysteria. I have also received cases in which these statements were made in the medical certificate, but the fact of coming under treatment, and being brought to the asylum, has acted as a shock of surprise, and no further demonstrations of excitement have taken place.

The suddenness of these states, and their variability, harmonise with the suggestion that these are nutritional disorders and not organic lesions. Of all the physical symptoms of hysteria, anæsthesia or disturbances of sensation, are the most constant, and cases are familiar to most hospital physicians of patients, who were completely helpless upon admission, yet who could move their legs in bed, or push their feet against an object, but could not stand or walk, yet with the stimulus of a strong emotion, or a new suggestion, they have walked easily, possibly after weeks or many months of bedridden helplessness. The anæsthesia in hysterical cases is somewhat pathognomonic. It may be in islets of skin not corresponding to any peripheral nerve distribution or that of blood vessels, neither does it conform to any spinal distribution, and it is not segmental or embryonic in character. It is total and complete, and corresponds with a cortical area having associated or systematised functions. Hysterical patients are not conscious of their loss of sensation, the loss does not come into their personality, and there is in consequence a "shrinkage" of consciousness. Such is not the case in the anæsthesia of gross lesions, which further suggests cortical affections. The cortex, moreover, besides sensation, controls the emotions, the heart's action, respiration, speech, and voluntary movement. All these may be, and often are, affected in hysteria.

In conditions such as "writer's cramp," and in the various and numerous other occupation neuroses, there is paralysis of different forms, but at the same time there is complete control over the hand, which can accomplish any movement other than

that which caused the paralysis. Such clinical facts as these distinguish between disturbances of function and disease of the organ—a heory which is thus capable of explaining the phenomena. The mental symptoms of hysteria are vividly portrayed in mental epidemics, such as are initiated by the so-called " revivalism," as also in cases of " possession " or " demono-mania," cases of witchcraft, and " cures " at holy shrines.

Another functional condition, which merges into insanity, is hypochondriasis. It is as closely related to sensation as hysteria is to the emotions. There is a feeling of profound illness, and a tendency to exaggerate and brood over the feelings, which give rise to morbidly conscious states. The whole of the person's attention is concentrated upon his sensations, but there is nothing abnormal to be discovered at the periphery, and the functions complained of appear to be physiologically healthy. If in hysteria there is a cortical absence of certain sensations—which may determine anæsthesia and paralysis—in hypochondriasis there may be cortical hyperæsthesia of these sensory areas, but whether due to exhaustion, or to some influence which modifies this exhaustion, and which brings these sensations into undue prominence, is not easy to ascertain. If, however, hypochondriasis be of long duration, the mental state, associated with it, tends to become fixed, which supports the view that long continued functional disorder tends to become organic, as we see when hysterical contractures are accompanied with sclerosis of the corresponding pyramidal tract.

A condition often met with in highly wrought, able, and overworked men and women, and now described by the term neurasthenia, is somewhat allied to hysteria. There is hyper-sensitiveness in both, but there are no sensory disturbances in neurasthenia, no motor paralysis, no fits and no contractures, although neurasthenia may occur in hysterical subjects. There is the same difficulty in fixing the attention and the same deficiencies of memory as in hysteria. The condition is probably the result of long-continued malnutrition and ill-health, and is favoured by civilisation and city life, by heredity and by various excesses. Of the exciting causes, possibly, influenza is as potent a factor as any, especially when acting upon an already exhausted constitution. I have seen many

such cases outside the asylum, not seldom among the "prize winners" in life; and although nature is generally uniform in her lesions, this functional state being of long duration is known to end in confirmed organic brain changes and chronic insanity, demonstrating its analogy to the contractures accompanied by organic lesions in cases of protracted functional hysteria.

Another functional condition, which is responsible for at least 8 per cent. of all cases of certified insanity, is epilepsy. The abnormal mental states associated with epilepsy are unlike ordinary insanity, for those, who suffer from it, are more altruistic, and they are less under the sway of delusions, but suffer more frequently from sensori-disturbances. The mental states of epilepsy seem to be half way between those of hysteria and true insanity, the sensori-motor disturbances are present, and so also are those of consciousness, which latter during the fit is completely in abeyance, yet it must be owned that there are no definitely ascertained lesions in cases of idiopathic epilepsy. Of all mental states in relation to the fit, that of post-epileptic automatism is the most inexplicable. After an epileptic fit a person will occasionally lose all memory of past ideas, he will wander about, take a new name, forget wife, family, and domestic attachments, assume a fresh occupation, and, oblivious of the past, start upon a new life, and remain in this fresh environment for an indefinite period, or until another fit brings back his recollection, and he returns home after a complete functional "topsy-turveydom." Some such occurrences in less striking forms are frequent, and are closely related to hysteria, but as they suddenly change, they remain unexplained by any organic or structural theory. I have recently had under my care three men certified as insane after a "fit" of some kind, which completely erased from their memory events in their previous life, and left them with a new personality.

In ordinary daily life we often find after fatigue that there is considerable difficulty in fixing the attention, we have a weakened grasp of our subject, and cannot recollect a lost word; there is difficulty in expressing our ideas in words. Long after we need it, the missing word appears, possibly in association with some remote expression, and we are unable to explain the phenomenon except upon the theory of disordered neuronic function. It has been pointed out by Gowers

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that the most common effects of overuse of the brain are sensory, and evidenced by some disturbances in the feelings which, as he states, are appalling in their variety and degree. This view, in my opinion, coincides with the evolution of insane ideas which are based upon sensory anomalies; but what it is that causes these functional disturbances is not so clear. Hodge describes a swelling but not a destruction of the cellular protoplasm in conditions of fatigue. Possibly some products of nervous overaction fail to be eliminated, and either poison the store material of the nerve-cell, or interfere with some obscure electrical or radio-active action at the synapses. As Gowers further states, we cannot estimate the cumulative effect to which a minute original variation in the nutritive material of a nerve-cell may give rise, but we have experience, and are aware that function can alter structure. In regard to some of the allied neuroses, cases of " convulsive tic " seem to me closely related to cases of delusional insanity and impulsive obsessions, those of neuralgia and megrim, of tetany and cramp, also closely resemble in their suddenness and intensity those of various forms of epilepsy.

These neuroses with chorea, and para-myoclonus multiplex seem to me to be heirlooms of psychopathic and neuropathic families, and, so far as it is at present known, are without definite structural pathology. I have at present under my care a case of para-myoclonus with mental symptoms, who is one of three members of the same family similarly affected. The mental state of patients suffering from what is styled "dementia precox," in my opinion seems to be closely allied to functional states, some of which appear to be physiological. The mental pre-occupation of ordinary normal health for instance bears much resemblance to the abstraction of these demented youths, and it may not be unreasonable to look upon the latter as functional states, for a few of these persons recover quickly, the symptoms are of short duration, and vary from slight moody self-absorption to complete lethargy and stupor. It is unlikely, however, that long continued stupor can exist without organic change in the pyramidal cells of the cortical area, as functional activity stimulates nutrition and is beneficial; whereas its suspended activity means a decreased blood supply and therefore a slower removal of used-up products and less nutritive plasma.

The normal physiological condition of pregnancy is another process with mental symptoms. It is a function which involves the reproductive organs and affects the whole organism. It is accepted that gestation is attended with a great deal of nervous disturbance in all women, the intimate sympathetic connection of the mammæ with the gravid uterus giving rise, even in normal persons, to various forms of neuralgia, headaches, dizziness, and insomnia, which may be so extreme that irritability, fractiousness, and despondency of a serious character ensue, yet these conditions completely pass off in the majority of cases when the fulfilment of this process is complete.

I purposely avoid any reference to the many toxic insanities, although the confusional delirium, and the acute hallucinatory states accompanying alcoholic intoxication, pernicious anæmia, puerperal toxæmia, cocaine, morphine, pellagra, and other poisons closely simulate those of febrile diseases and coma.

CESSATION OF EPILEPSY CONSEQUENT ON REMOVAL OF ADENOIDS.

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[With Plate XL.]

IN the summer of 1898 the little girl whose photograph is shown in the Figure (1) was sent to me by Dr. Ferrier, with the following note :—

"She is under my care for *petit mal,* but she is getting deaf, and there are signs of some throat affection—probably adenoids. I am sure the epilepsy will also be benefited by the removal of this discomfort."

The child was six years of age, and on enquiry it was stated that she had been subject to fits from the age of four. Two attacks of *petit mal* occurred during her visit to my study, *i.e.,* two fits within twenty minutes. During these her head was thrown back, the eyes turned up, the upper eyelids twitched, and the inspiration was shallow and noisy. Each attack only lasted a few seconds, and the patient recovered consciousness without falling from her chair.

The parents reported that she had caught cold a month or two previously, and had since been noticed to be deaf and a mouth-breather. She was also said to be very restless in bed; talking in her sleep, and throwing off the clothes. but there was no enuresis.

As is well shown in her photograph, the child had a marked adenoid facies (Fig. 1). She was a constant mouth-breather; the root of the nose was very broad ; and the inner fold of each upper eyelid, which by some is thought to be accentuated with adenoids, was well marked. She was said to have a dry nose, and anteriorly the nostrils appeared normal. The molar teeth had not fallen, but the pallate appeared a little arched.

The child was deaf, so that whispered speech was heard only at a distance of two yards. The membranæ tympani were very translucent, only slightly retracted, and the pink injection of the inner tympanic wall was easily visible, shining

PLATE XL.

Fig. 1. *Photograph in 1898. Child, aged 6, affected with naso-pharyngeal adenoids, and subject to epilepsy since the age of 4.*

Fig. 2. *Photograph in 1904. Child aged 12. This is the same child shown in* Fig. 1, *but six years after the removal of adenoids and the cessation of epilepsy.*
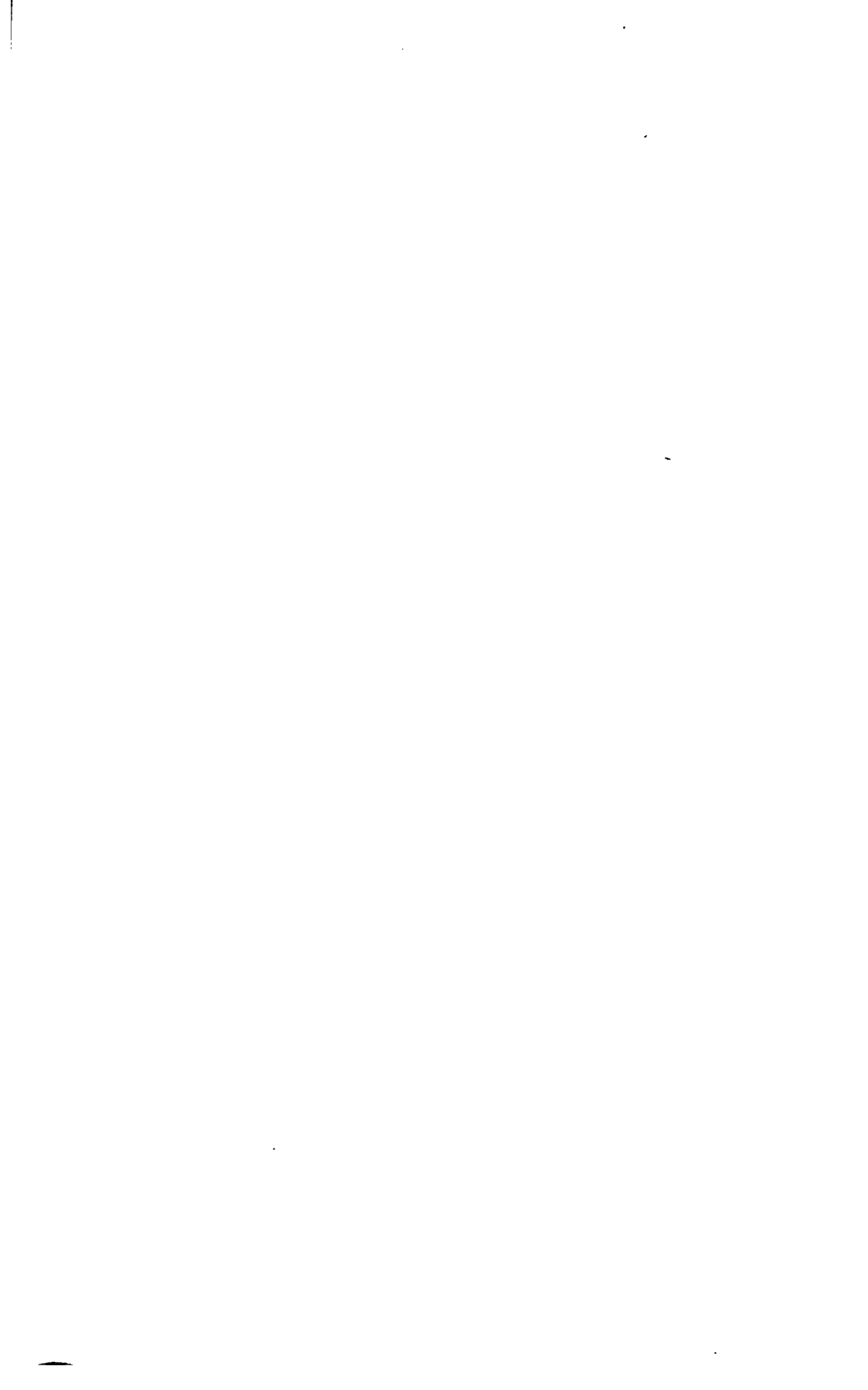
through the drum membrane. In children this appearance is very characteristic of Eustachian and middle-ear catarrh from adenoids, and, with digital examination, these growths were found to be plentiful. There were no palatine tonsils.

It was explained to the parents that the removal of the adenoids was unquestionably indicated on account of the condition of the ears, and would probably prove beneficial in other directions.

A large mass of adenoids was removed on August 25, 1898. On September 7 the patient had ceased to be a mouth-breather; the membranæ tympani no longer showed pink; and she heard a whisper at four yards. She was reported to sleep quietly and to be much brighter in herself, but the fits still continued.

I did not think of writing to the parents for four years, and then (in 1902) they reported that the fits had ceased within a few months of the operation, and had not recurred. The next time I saw the patient was in March, 1904. Her appearance is shown in Fig. 2. She was found to be a very self-possessed, bright, and intelligent girl of 12, weighing 6 stone 8 pounds, *i.e.*, more than 16 pounds above the average. She is no longer a mouth-breather; she has no trace of adenoids, and her hearing is perfect. There is no marked arching of the hard palate. The parents reported that for a few months after the operation she continued to take bromide under Dr. Ferrier's advice, but that the fits had left her—as already reported—soon after the operation, and had not recurred. She had taken no bromide for six years. She is at the present moment nearly 13 years of age, and has had no fits for seven years.

I have had other cases where adenoids have been removed in epileptic children without the satisfactory result above recorded, but I am prompted to put even one success on record. For there appears to be a general consensus of opinion that the most unsatisfactory cases of epilepsy are those in which the disease commences under 10 years of age; they show the smallest percentage of recoveries, and the largest number of confirmed cases.[1] In a debate at the Royal Medical and Chirurgical Society this feature was agreed to by several speakers.

[1] Aldren Turner: *Transactions Medico-Chirurgical Society,* June 9, 1903.

Dr. George Shuttleworth, from his experience of epilepsy in children, could only record one instance of recovery out of a large number of cases.

Dr. Newton Pitt observed that practically the majority of cases, which failed to yield to treatment during the first year, were not hopeful, and Dr. Fletcher Beach asked why the cases under 10 years of age should present such a large number of confirmed cases.

I do not claim that the patient referred to above is permanently exempt from recurrence, as it is held that relapse will occur sometimes, even after nine years, and particularly at the onset of puberty.

The relief, however, seems fairly attributable to the operation, and there is no doubt of the improvement it has wrought in the child's appearance, and in her general physical and mental well-being.

THE DIETETIC TREATMENT OF DYSPEPSIA.

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THE term "dyspepsia" is admittedly a bad one, and is only used here for convenience as covering all cases in which any pain or discomfort is experienced during the process of digestion. Such cases may be divided into two great groups : (1) those in which there is present some organic lesion of the stomach, such as ulceration, malignant disease, catarrh, or dilatation ; (2) purely "functional" cases, all of which have probably a nervous basis, and in which either the secretion or the motility of the stomach, or both, is in some way disordered.

It may be said at once that dietetic treatment is of far greater service in the organic than in the functional cases. In the former one has to deal with a definite and easily recognised morbid condition, the indications for the dietetic treatment of which are obvious, and can easily be embodied in a few more or less simple rules. The functional cases, on the other hand, are often so ill-defined, so capricious, and so influenced by the "personal factor" that their treatment by diet is a matter of much greater difficulty, and must often be confined to the interdicting of certain articles which are likely to prove harmful. This may seen at first sight a rather pessimistic view to take, but I think that the more one sees of such cases the more one is driven to believe that they are often little, if at all, influenced by the most elaborate schemes of diet. The soundest advice, indeed, which can often be given to such patients is to tell them to throw all their diet schedules to the winds, and to eat anything they like, or whatever they think agrees with them, for their individual peculiarities are so numerous that the patient, if he be at all intelligent, very quickly learns to know better than the doctor what suits his own stomach.

Before passing on to describe the dietetic treatment of the different forms of dyspepsia in detail, it will be well to take up

some general considerations which are applicable to all of them.

In the first place, it is important to bear in mind that the chief function of the stomach is a *mechanical* one—it has to reduce the food to a state of solution and then to pass it on into the duodenum. In any case, therefore, in which the secretory power of the stomach is diminished, or its motility impaired, the diet should be of such a nature as to be most easily dissolved and passed on. This means that the meals must be small in bulk, and their components readily disintegrated. It is the large bulk of the coarser vegetable foods, for instance, and their richness in insoluble cellulose, which make them harmful to most dyspeptics, whilst the great amount of dense connective tissue, present in the tougher meats, renders them difficult of disintegration, and causes them to be equally injurious. In like manner foods, which are richly impregnated with fat, are found to be difficult of solution in the stomach, for the fat encloses the other constituents, and hinders the ready access to them of the gastric juice. It is for this reason that such articles as muffins are notoriously indigestible. Again, the more readily any article of food can be reduced to a pulp by chewing, the less work does it subsequently impose upon the stomach. Such articles as cheese and new bread, which can easily be swallowed in lumps, are therefore potent causes of indigestion, and must be carefully avoided in all gastric derangements.

The term "digestible" thus comes to be synonymous with "easily dissolved," and foods can be arranged in the order of their digestibility in accordance with the facility with which they are reduced to a liquid state in the stomach, and passed on into the duodenum. Leube divides foods on this plan into four groups, the first group containing those which are the most "digestible" :—

1. Beef-tea, lightly-cooked or raw eggs, milk, biscuits.
2. Sweetbread, boiled fowl or pigeon.
3. Scraped underdone beefsteak, potato purée, stale bread.
4. Roast chicken or veal, cold roast beef (underdone), white fish, macaroni, rice, chopped spinach.

It will be convenient to have such a table in mind when planning the dietary of a patient with dyspepsia.

In the second place it must be remembered that, as modern investigations have shown, the secretion of gastric juice is but little influenced by the mechanical stimulation of the stomach by the food, but depends partly on the chemical constituents of the meal, and partly upon the so-called " psychical " factor, *i.e.*, a secretion called out reflexly by the smell and taste of the food itself. In all cases of dyspepsia, therefore, in which the gastric secretion is particularly at fault, the chemical composition of the diet will be of great importance, whilst in those in which there is a tendency for the production of gastric juice to be in defect, the "psychical" influence should be brought as much as possible into play by ensuring that the food is well cooked, served in an appetitising manner, and eaten in agreeable surroundings.

Lastly, it should not be forgotten that the body as a whole must never be allowed to suffer for the faults of one organ. In other words, one must not be so strict in dieting a dyspeptic patient that his general nutrition suffers in consequence. It is in the functional cases that this rule is most prone to be forgotten, and, in curing the stomach, the doctor is apt to allow his patient to become seriously underfed. In this way a vicious circle is established, for it is often the impaired nutrition of the patient which is the very thing which has led to the enfeeblement of his stomach, and the first step towards a cure in many cases is to bring about a greater state of vigour in the whole body. It is well to make it a rule that, in every case in which a patient's diet has to be seriously reduced, treatment should be carried out in bed. The expenditure of the body is thus minimised, and the risk of physiological bankruptcy avoided.

We may now pass on to consider in detail the dietetic treatment suitable for the chief varieties of impaired digestion.

GASTRIC ULCER.

The *indications* in the dietetic treatment of gastric ulcer are to supply the patient with food which will irritate the ulcer mechanically as little as possible, which will neutralise the usually excessive acidity of the gastric juice, and which will tax as little as may be the motor power of the stomach, and so ensure as much rest as possible during the healing process. No

food meets these indications better than milk, for it is mechanically unirritating, it has an unusually high acid-neutralising power, and it throws very little work on the motor functions of the stomach. Experience fully confirms the truth of these anticipations, and by common consent milk is the best food in the treatment of gastric ulcer. Sometimes, however, and especially when there has been recent hæmatemesis, even milk may not be well borne, and in such cases it may be necessary to stop all food by the mouth, and to feed the patient by the rectum exclusively. Such complete rest of the stomach has been carried out in some cases for as long as three weeks at a time, but it must be regarded as exceedingly doubtful whether the enemata really contribute in any serious degree to the patient's nutrition. It is more probable that they act simply by supplying him with the necessary amount of fluid, and that, during the period of their administration, he is really living upon his own fat. Be this as it may, the value of the treatment in certain cases is undoubted, but as soon as possible the administration of milk by the mouth should be begun. At the outset ten ounces of milk may be given every two hours throughout the day, and a couple of biscuits may be allowed with each feed. Beef-tea may be substituted for two of the feeds, if the patient wishes it, and if the milk palls it may be sometimes flavoured with a little coffee or chocolate. After the lapse of a week or ten days, if all pain has disappeared, some of the milk may be thickened by the addition of a little arrowroot, or Benger's food, and thick soups, one or two well-beaten eggs and some boiled rice may be allowed in addition. After another week a little mashed potato, boiled sweetbread and pounded chicken or fish may be added, and from this the diet is gradually built up, following the scale of "digestibility" already indicated.

It is a good rule, however, in the dietetic treatment of gastric ulcer "to make haste slowly," and any return of pain should be the sign for a step back to a simpler regimen. It is not until a couple of months have elapsed, that it is safe to allow the patient to eat anything he likes, and even then only in small quantities, and for a long time it is better for him to avoid the more "indigestible" articles as well as extremes of temperature in the things that he eats.

DILATATION OF THE STOMACH.

The *indications* for dietetic treatment in dilatation of the stomach are :—(1.) To avoid over-burdening the organ with any large mass of food at one time, and so helping to increase the dilatation. The meals must therefore be small. (2.) If actual stagnation of the contents be present, fermentable substances must be avoided as far as possible, for by leading to the production of gases, they will only still further distend the stomach. (3.) Attention should be concentrated upon rendering the food easily passed on into the intestine, rather than upon any attempt to make it capable of absorption in the stomach itself, the reason being that even, under the most favourable circumstances, the stomach absorbs but little, and, when it is much dilated, the process is probably arrested altogether.

The fulfilment of these indications is not always an easy matter, and the best method of doing so must vary in different cases. Where the dilatation is only slight and of the atonic sort, without there being any actual obstruction at the pylorus or stagnation of the contents, it will be sufficient to see that the meals are small, dry, and composed mainly of animal constituents.

Nothing seems to embarrass the atonic stomach more than to have to deal with a mixture of liquids and solids, and in such cases the patient must be strictly enjoined not to drink with his meals. The necessary amount of liquid may be made up by taking sips of hot water between times. All saccharine articles should be avoided, and the starchy constituents restricted to rusks, torrefied toast, or pulled bread, for by this means the production of flatulence is reduced to a minimum.

Should there be actual obstruction at the pylorus, with stagnation of the contents, it will be necessary to proceed on a different plan. In such a case one must begin by cleansing the stomach by thorough lavage, which may be repeated daily, if necessary, and the diet should consist largely of milk, peptonised if necessary, and administered in small and frequent feeds. The milk may sometimes be enriched with advantage by the addition of one of the concentrated proteid foods, such as Plasmon, and a limited quantity of starchy food in the form,

for preference, of biscuits or rusks, may usually be allowed with safety.

It should never be forgotten that patients with pyloric obstruction and copious vomiting, or in whom lavage is being carried out, are very apt to suffer from a deficient supply of fluid to the tissues, and much of the cachexia and wasting, which they exhibit, is really to be attributed to this cause. In such cases the supply of fluid should be supplemented by the administration of water by the bowel, a pint of normal saline being injected night and morning. If this be omitted, the excretion of waste products by the kidneys is apt to become interfered with and uræmic symptoms may supervene.

ACUTE AND CHRONIC GASTRITIS.

In *acute catarrh* of the stomach the great indication is to give the inflamed organ rest. All food should therefore be withheld so long as vomiting is urgent, thirst being relieved by sips of hot water or the sucking of fragments of ice. If there be great depression it may be necessary to administer a little stimulant, champagne being the best form to give. Should vomiting continue for a few days it may be advisable to feed per rectum, but this is rarely necessary as the inflammation is usually but of short duration. As the symptoms subside, treatment must be carried out as in gastric ulcer, although it is generally possible to return to ordinary diet much more rapidly than it is in that disease.

In the dietetic treatment of *chronic gastritis*, the chief indication is to avoid giving any article of food which may irritate the mucous membrane of the stomach either mechanically or chemically, and excite a secretion of mucus. All crude and coarse articles must therefore be forbidden, such as the stones or skins of fruits, whole meal bread or oatmeal, and tough meats. Mustard, spices, pepper, and condiments of all sorts fall under the head of chemical irritants, and are therefore injurious, and so is alcohol, especially in its more concentrated forms. Sugar, especially cane sugar, is also harmful, for it is a potent excitant of mucus-secretion. Most fatty substances, especially cooked fats, are injurious, but butter and bacon fat can usually be eaten in moderation. Care should be taken that the food is finely divided, eaten slowly,

and but little consumed at a time. The following schedule would represent a diet suitable for an average case :—

BREAKFAST.

Lightly-cooked eggs ; white fish (boiled), but not mackerel or herring ; a little crisp bacon (not too fat), fowl or game ; hard dry toast with a little butter (no marmalade) ; a small cup of weak China tea with milk, but no sugar.

LUNCHEON.

Lean mutton, underdone ; roast beef or white fish, &c., as at breakfast ; a spoonful of mashed potato with a little spinach or cauliflower ; dry toast or a rusk or two ; custard pudding or unsweetened jelly ; a glass of alkaline mineral water (Apollinaris Rosbach, or Perrier), with perhaps a little claret or hock.

DINNER.

A very little clear soup free from fat ; white fish (boiled) without sauce ; meat as at luncheon, or a little sweetbread or tripe ; vegetables as at luncheon ; custard, jelly or stewed fruit (free from skins and stones), or a little plain milk pudding, dry toast ; no savoury or dessert ; a glass or two of good claret or burgundy, and some mineral water, no coffee.

THE FUNCTIONAL DYSPEPSIAS.

The functional disorders of the stomach may be divided for convenience into three chief groups : (1) those in which there is an excessive secretion of acid or of gastric juice (" acid dyspepsia ") ; (2) the " asthenic " cases in which the secretion of acid or of gastric juice is diminished with or without some impairment of motility as well ; (3) cases characterised chiefly by flatulency.

(1) Cases of " acid dyspepsia " are met with in three stages. In the first there is simply an intermittent over-production of hydrochloric acid which produces a certain amount of pain beginning about the middle period of digestion. To this stage the term *hyperchlorhydria* is applied. If the disease persists, the over-production of acid becomes more or less constant, and is accompanied by a greater or lesser degree of pyloric spasm. This stage is known as that of "continuous hypersecretion." After the pyloric spasm has gone on for some time it leads to

dilatation of the stomach which represents the culminating stage of " acid dyspepsia."

A patient may present himself to the physician in any one of these stages. The first stage, that of simple hyperchlor-hydria, is usually met with in young men who are otherwise in perfect health. The second and third stages only occur after the lapse of some years, and are therefore found in patients of about the middle period of life who give a history of more or less prolonged, though at first intermittent, gastric trouble.

The dietetic treatment of each stage may now be considered.

As regards the most suitable regimen in simple *hyperchlor-hydria* two opposing views are held. According to one, the best diet is that which excites the least secretion of acid in the stomach, and for this purpose there can be no doubt that farinaceous food is most adapted. According to the other, one should abandon any attempt to strike at the root of the disorder, and content oneself with prescribing such a diet as is best fitted to absorb and neutralise the excessive production of acid. It seems to the writer that the second plan is that which yields the best results, and one has therefore to ask, what foods are most capable of absorbing and fixing hydro-chloric acid? Now, there can be no doubt that the more proteid a food contains the more hydrochloric acid is it able to take up and fix; and hence it follows that the most suitable diet in cases of hyperchlorhydria is one mainly composed of animal constituents, for these are richest in proteid. There is no better animal food for the purpose than milk, for it is a better fixer of acid than any other, and it should always enter largely into the diet of such patients, but meat may be taken freely too. On the other hand, all chemical excitants of gastric secretion should be avoided, such as salt, pepper, mustard, spices, pickles, and condiments of all sorts. Sugar and all sweet things, which call forth a secretion of hydro-chloric acid without neutralising it, are also harmful; and so, it need hardly be said, are sour things, which may add to the already existing over-acidity. Fats, on the other hand, seem to have a distinctly restraining influence on gastric secretion and may be partaken of freely, especially in the form of butter and bacon.

When the second stage is reached and the over-production of acid becomes continuous and complicated by pyloric spasm, a stricter regimen is indicated, and, at the outset of treatment at least, all such patients should be restricted for a time to milk alone. As the symptoms subside some farinaceous food and eggs may be added, and the diet gradually brought up to that recommended above for the stage of simple hyperchlorhydria. If the final stage of the disease has been reached, and dilatation is already present, the most suitable diet will be that recommended for dilatation in general.

(2) In the *atonic forms of dyspepsia*, in which the functional power of the gastric secretion is diminished, the dietetic indications will be precisely the reverse of those which obtain in cases of the first group.

Here the chemical excitants of gastric secretion should be freely partaken of, *e.g.*, soups, meat extracts, salts and other condiments, whilst, on the other hand, foods which make great demands on the solvent powers of the secretion, *e.g.*, meat, should be restricted or presented in such a form that they will pass on as quickly as possible into the intestine. Seeing, too, that the motor power of the stomach is apt to be defective in cases of this group, care should be taken that the meals are small, and that all bulky articles are avoided.

It is in these atonic cases that alcohol in some form is perhaps specially useful, acting as it does both as an excitant of secretion and as a stimulant to the movements of the stomach wall.

(3) In those cases in which *flatulence* is an outstanding symptom an appropriate diet can effect much. In such all fermentable articles should be forbidden, especially green vegetables, the pulses, and sweets. Rusks or crisp toast should be substituted for bread, and potatoes should only be eaten very sparingly. The meals also should be *dry*, for the presence of both fluids and solids in the stomach seems specially favourable to the production of flatus. Tea seems to be a peculiarly harmful beverage, and should be avoided altogether by patients who suffer from flatulence. The best beverage in most cases is hot water, which should be drunk between meals.

THE PATHOLOGY AND TREATMENT
OF PUERPERAL ECLAMPSIA IN THE LIGHT
OF RECENT WORK.

By ALFRED W. SIKES, M.D., B.S., B.Sc. (LOND.), F.R.C.S., M.R.C.P.,
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(Concluded.)

GLOCKNER[34] mentions three cases of eclampsia where there was a history of epilepsy, and two cases where there had been eclampsia at a former confinement, and one of these had epilepsy 1 month, and the other 4 months, after a subsequent confinement. He also mentions a case of Carbon bisulphide poisoning, where there were all the post-mortem signs of eclampsia. Then at Queen Charlotte's Hospital in 1903, there was one case where the fits were very similar to epilepsy, and another, where they resembled hysteria. In another case quoted, where there were 12 fits during birth of the child, and the patient died 3 hours after delivery, there was no albuminuria, but the liver showed necrosis, and the heart muscles cells cloudy, swelling, and fatty change, but the kidney only congestion; still here there was interference with the function of the heart, liver, and kidneys. Schmorl[63] thinks that in some of these cases the stasis in the liver due to cardiac weakness is a causative agent. Again, one can well imagine that a small amount of kidney change will cause fits in patients whose cortical excitability is above the normal. The above-mentioned cases show that there are at least some doubtful cases under the headings of eclampsia and "eclampsia without albuminuria," others perhaps where the urine was not carefully examined, and perhaps a few true cases where the other organs —heart and liver, especially—were so diseased that a very slight kidney change was sufficient to precipitate eclampsia. It is probable that some of the cases of eclampsia without albuminuria should come under the heading of hepatic eclampsia, where the liver is chiefly affected.

Wilson[80] mentions a case where primary pneumo-coccal meningitis simulated eclampsia. Zweifel[87] found in 129 cases of eclampsia there was albumen in 100 per cent., and says that the cases of eclampsia without albuminuria are not supported.

It is quite conceivable, as there is so much doubt about these cases, that there will be a difference of opinion *re* prognosis. V. Goedeki [25] said that in eclampsia nothing definite could be stated as to prognosis by the amount of albumen in the urine as in some cases there was no albumen. Spiegelberg, in his text-book, says that the cases where there is no albumen are mild cases, and Ingerslev [32] agrees with him ; Lohlein [40] that they are not so dangerous ; but Sinclair and Johnson [65] say that they are very severe.

Again, it has been found that the liver appearances, no more than the kidney, bear any definite relation to the severity of the case ; but I think one always finds *either* the liver *or* the kidney showing marked degenerative changes—not always both—in the cases which come to post-mortem examination.

It is probable that there is an *increased cortical excitability* at the time of confinement, and perhaps during pregnancy. Blumreich,[7] from experiments, thought that the cortex of pregnant rabbits was more sensitive than non-pregnant. Dienst [15] mentions that one kidney of a pregnant rabbit was excised—and in another rabbit part of the liver—both animals died with convulsions, and the foetus shows pathological changes similar to those found in eclampsia. Now removal of one kidney in a non-pregnant animal does not cause this. Van de Velde [71a] came to the same conclusion by means of injections of substance into the blood of pregnant and non-pregnant animals. The irritability of some of the peripheral nerves is well known, and also that cerebral emotion—shock, fright, digestive troubles, retained urine, etc.—will at times act as the immediate exciting cause.

The influence of the condition of the heart.—Fehling [20] rather passes over the influence of impairment of the heart. In normal pregnancy there has been some difference of opinion as to the area to be made out by percussion. Many observers have noticed an increase in cardiac dulness, and at the same time corresponding alteration in the pulse. Müller [46] was more exact in his measurement of the hearts of pregnant and non-pregnant women, and accepted the hypertrophy of the left ventricle and the associated rise in blood pressure. It is difficult to say how much hypertrophy there usually is, as the sizes post-mortem have been seen to vary so much.

U U

In all cases of eclampsia there has been found to be more or less degeneration of the cardiac muscle. Schmorl [63] found it scarcely ever absent whether the cases were slow or rapid ones. From the preceding account of the pathology of eclampsia it seems more probable that this degeneration is primarily due to the condition of the blood and not to the kidneys.

The hypertrophy of normal pregnancy is quite well enough accounted for by the extra strain on the system by the products of fœtal metabolism.

Schmorl [63] mentions experiments on animals where extract of thymus was injected into the circulation, and while as the result there was degeneration found in the kidneys and liver, the heart was normal ; and mentions that in eclampsia the heart, liver, and kidneys all usually show signs of degeneration. Still one must remember that in the latter condition the poison has been acting for a much longer time.

The heart at the beginning of pregnancy, due perhaps to old valvular or muscular changes, may be approaching the limit of its reserve power. It is known that in chronic heart and kidney disease there is a greater frequency of abortion, as the system is unequal to the extra strain. Feis [22] found that in 40 per cent. of these cases the fœtus arrived in the world dead, and thought that chronic condition of heart and kidney were a protection against eclampsia. Still it is theoretically probable that those, who get to the end of pregnancy without abortion, will be more susceptible to eclampsia. Out of 66 of such cases mentioned by Wessner [77] it was found that 7·58 per cent. had eclampsia, or many times the normal proportion. These cases occurred before 1884, and now the numbers are probably less as induction is more frequent. Kattenbach [44a] looked upon previous disease of the heart and kidneys as being important with regard to eclampsia, and in this also Dienst [15] agrees. When eclampsia occurs in women who have had many children it is probable that cardiac weakness is one of the causes.

Post-partum Eclampsia.—After delivery the amount of albumen usually disappears very quickly—in some cases where the urine is semi-solid on boiling before delivery—on the second or third day after there will only be a trace. Trautenroth [70] and Jaccoud [33a] have noted cases where there has been an increase in the amount of albumen after labour. Very likely

this is due to the extra pressure on the ureters and vessels of the kidney during labour ; perhaps the involution changes in the uterus may help, and the large amount of muscle products thrown into the circulation from the peripheral and uterine muscles. The blood pressure falls after birth, and Dienst concludes that this fall of the blood pressure and the products from uterine involution have to do with the causation of post-partum cases. But as most of these cases occur within the first six hours after, the involution changes in the uterus cannot have much to do with it. Other possibilities are stasis of the liver due to fall of blood pressure ; stasis of the blood in the kidneys due to the absence of the fœtus and laxity of the abdominal walls ; and, perhaps, as has been already suggested, the extension of pre-existing thrombi ; or, perhaps, possibly, the influx of placental cells into the circulation as the placenta is separating. The condition of exhaustion of the nervous centres would also predispose. Again, during labour, when the head is down in the pelvis, there must be some extra congestion of the kidneys, and less chance than ever of the metabolic products leaving the body.

Dienst [15] and many other writers have mentioned eclampsia in the mother and child, but I do not know how an eclamptic fit in a child is to be distinguished from an ordinary infantile convulsion.

Many writers have also described various *bacteria* as the cause of eclampsia. One of the exponents of the bacterial theory of causation is Stroganoff.[60] He mentions that in the kliniks there is a certain relation of cases to one another ; but Meyer-Wirz,[44] in criticising his statements, cannot confirm with regard to cases in the Zurich Klinik, and the experience of most observers is that the cases of eclampsia are absolutely independent of one another.

Albert [3] and Müller [47] support the theory that there is an infection from the decidua and placenta as separation approaches, but this surely must be looked upon as impro-bable ; the latter writes about a latent microbic endometritis, and both writers consider eclampsia to be due to a general intoxication from the absorption of bacterial products from the placenta, etc.

The statistics on the incidence of eclampsia vary according

to different authors, and are misleading as to many cases
where a sufficient number of cases is not taken. Loblein found,
in a collection of cases from the German kliniks, 1 in 278 ; but
in kliniks there are a great many primipara, which increase
the proportion.

Buttner,[12] in the province of Mecklenberg-Schwerin, found
1 case of eclampsia in 600 to 650 births.

In Würtemberg, where the disease is so rare (Doderlein,
ref. Harig[20]), there is only 1 case in 3561, these numbers being
taken from 644,567 births.

About 75 per cent. of the cases occur in primipara. Meyer-
Wirz[44] in his cases gives 74·4 ; these were cases from the
klinikin Zurich. With regard to cases occurring before, during,
and after labour, Schroeder (quoted, Meyer-Wirz[44]) gives the
numbers as 19·62 before, 60·87 during, and 20·25 after, labour.
Here, again, the numbers quoted by different writers vary a
good deal.

It has been seen that the organs of the mother and child
are affected in much the same way ; also the tendency to
eclampsia increases as the time for delivery approaches ; the
disease is more frequent with twin pregnancies, and, considering
the increased metabolism occurring in the mother during preg-
nancy, many authors have discussed the probability of poisons
absorbed from the fœtus as being the cause of eclampsia.

There is, however, as we have seen, no evidence that there
is an accumulation of any simple body in the blood or given
out in the urine of the mother ; urea, ammonia, carbonates,
carbamic acid, sulphates, lactates, have all been discussed, and
nothing has been found beyond the fact that there is a *deficient
oxidisation* in the body. There does not seem to be any
definite support for the theory of acid poisoning—although
it seems a possible explanation. Lactic acid in the urine
occurs during muscular exertion. Further experiments in this
line, and with regard to cases where the urine is alkaline, will
be interesting. One must remember, as already mentioned,
the extreme difficulty in determining whether any one con-
stituent of the blood, normally present in very small quantities
—as, for instance, urea or ammonia—is really increased or
diminished, especially when one has to deal with chemically
unstable substances.

I think one cannot make any boundary line between

the albuminuria, slight or severe, of pregnancy, and that of eclampsia ; they are apparently due to the same cause. I also do not see the necessity for assuming that there is any one poison. Will not non-elimination of the normal metabolic products of the fœtus quite account for the *commencement* of the disease ?—this non-elimination being accounted for by renal inadequacy due to extra strain on the kidneys hampered by pressure on the ureters, and by the alteration in the pressure in the renal blood system. When once these metabolic products cannot leave the system, the liver is soon deranged, and deficient oxidisation here makes the condition worse. The mother's own metabolic changes are interfered with, and insufficiently oxidised proteid substances, circulating in the blood, act on all the tissues, blood vessels, etc., causing an increase of fibrin in the blood and thromboses in the vessels of both the mother and child. That the freezing point of the blood is unaltered is in favour of compounds containing large molecules, such as partially broken down proteid substances might give rise to.

The theory that the placenta may be the origin in some cases seems at least possible, and we must admit its applicability to the possible causation of the post-partum cases.

That substances in the blood of the mother can easily get to the child's blood, and *vice versâ*, is rendered very probable by the experiments of Krönig and Fürth [37] on the osmotic pressure in the blood of the mother and child at each side of the placenta.

The fits in eclampsia usually stop at the death of the fœtus, although exceptions are known, and a long continued illness of the mother with albuminuria and eclampsia is, as one would imagine, very bad for the child, and theoretically one would expect either death or delivery of the child the best thing for the mother.

The chief points with regard to the outbreak of eclampsia are the quantity of the metabolic products, the time they have been in accumulating, and the relation between accumulation and elimination.

Another point is, how much a condition of constipation and consequent copræmia has to do with the symptoms, *i.e.*, is the alimentary canal in any way responsible ? One would certainly expect such a condition as eclampsia to be made much worse by constipation.

Schaller [61] and Drüllman,[16] using phoridzin, found that the kidney of the fœtus did not function in the same way as in extrauterine life : and it is doubtful to what extent metabolism can go on in the liver of the fœtus. In any case the liver, as well as the kidney, of the mother must have much increased work to perform. I do not know of any cases where the influence of previous disease of the liver alone has been established in relation to eclampsia. All the work on eclampsia shows that the difficulty of elimination is the paramount cause ; and anything which interferes with elimination—old disease of heart or kidneys, narrow pelvis, or protracted birth —all favour the onset of the disease. Kattenbach [34a] gives two cases of contracted pelvis illustrating this. A large child or excess of amniotic fluid will act in the same way. With twins there is, of course, greater pressure and a greater fœtal metabolism, so one would expect greater frequency of eclampsia. Bremme,[10] 1903, of 16,121 cases of pregnancy, including 181 cases of twins and 4 cases of triplets, found 324 cases of eclampsia, or 2·01 per cent.—a large percentage. Of the 185 cases of multiple birth, 24 had eclampsia, or *12·97 per cent.*

With uræmia, as with puerperal albuminuria and eclampsia, substances collect in the system and act as poisons, in the two latter the substances seem more closely allied to proteid ; but beyond this point we have not advanced, and in pregnancy the increased cerebral and reflex excitability must be taken into account in eclamptic cases.

Prognosis.—Something has already been said on this subject when discussing the cases of eclampsia without albumimuria. With regard to the generality of cases, Prutz, as mentioned above, stated that the microscopical appearances have little relation to the severity of the disease, and it certainly is true that many severe and sudden cases do not show so much change in the liver and kidneys as one might except.

From the clinical aspect, however, it is generally thought that the smaller the amount of albumin, the more normal the pulse in rhythm and tension, the nearer the onset of the fits to the end of pregnancy, the shorter time the fit lasts, and the greater the time between the fits, so much better will the prognosis be.

Wyder [44] gave the mortality for all cases of eclampsia as

about 20 per cent., and mentioned that it was better in the kliniks. Buttner,[12] from an examination of the cases in the province of Mecklenberg-Schwerin, 34·08, but it is probable that some cases of pneumonia, etc. following, or associated with, eclampsia are included ; and Buttner thinks the smaller death-rate in the hospitals is due to better and more immediate help. Meyer-Wirz,[44] in 117 cases, found a mortality of 27·3 per cent., but taking the returns for the last ten years in the Zürich Klinik, only 23·3 per cent. ; this last-mentioned writer also suggests, which seems to be very probable, that the disease varies in severity in different countries ; for instance, Bidder[9a], from 1873 to 1891 in St. Petersberg, gives a mortality of only 17·3 per cent. ; this variation of severity is seen by the incidence, by the character of the cases, as well as by the mortality, and it cannot be accounted for by difference in the treatment in different kliniks ; for example, the procedure in eclampsia in Halle is the same as at St. Petersburg, but the resultant mortality is much less at the latter place. Stroganoff mentions, at St. Petersburg, 58 cases and no deaths, and another series of 113 with only a mortality of 5·3 per cent.

Winckel[81] gives the mortality in Munich of the 92 cases in many years as only 7·6 per cent.

Knapp, in one of the Prague kliniks, of 4,470 confinements, found only 22 cases of eclampsia, with a mortality of 4·5, and the average number of fits only 5·7. So that the incidence and severity here were low. Again, in Vienna (refer Zweifel[67]) in 42,607 confinements between 1800 and 1895, there was an incidence of 1 to 311, and of these 19 were brought into the klinik in an unconscious state, and the average number of fits was 8 ; but in Leipsig (quoted Glockner), of 6,902 confinements in five years, there were 143 cases of eclampsia ; 91 of these were brought into the klinik in an unconscious state, and the average number of fits was 13 !

The statistics of the more northerly kliniks of Leipsig, Berlin, and Halle, etc. are worse as regards incidence and mortality.

So that, in spite of the treatment in each klinik being what at that place they had personally found to give the best results, one sees that the incidence and severity vary in different places.

It is remarkable that in Würtemberg, as mentioned by Döderlein (*Giessen Congress,* 1901), eclampsia is exceedingly rare, and it is suggested that the sour wines of this country, containing citrates, tartrates, &c., forming, as they are known to do, carbonates in the blood, *may* be the cause of the low incidence there.

The mortality in multipara is higher than in primipara, the numbers given by Meyer-Wirz[44] are 33·3 per cent. and 24·1 per cent., but one must remember, as Wyder[84] points out, only the severe confinements in multipara go to the kliniks, so that statistics are here not so certain.

Wyder[84] gives the following numbers *re* mortality in cases occurring before, during, and after labour. Before, 39 per cent.; during, 12·5; after, 17·4; but Schauta (*Archives für Gynækologie,* Vol. 18) gives 52·5, 40·2, and 27·2.

After confinement the mortality and incidence lessen as the time after increases.

Other co-existing diseases, of the heart and kidney specially, influence the prognosis unfavourably.

All the more recent work seems to show that there is a smaller mortality with the " active " than with the "expectant " treatment. This will be referred to later ; but although the quick delivery of the child does not *always* stop the fits, most observers agree that it *usually* does.

In spite of a certain connection between cold damp weather and the incidence of renal disease, there is nothing certain as to its cause on the commencement of eclampsia.

Sturmer,[67] however, notes in Madras a greater number brought into the hospital on dull and cloudy days, and thinks it due to the skin not acting so well on these days.

Olhausen[80] thought there was a greater incidence between October and May ; Buttner, on the contrary, says May to October, and in this Meyer-Wirz[44] agrees, as the majority of the cases he reports occurred in Midsummer.

Generally, on account of the nature of the disease, I think more will be done towards reducing the mortality by reducing the incidence than in any other way, but when once the disease has started, certainly most observers are agreed that the best results are to be obtained by an " *active* " as opposed to an " *expectant* " treatment.

TREATMENT.

In cases of albuminuria and signs of renal inadequacy in pregnancy, specially in primipara, great care should be taken. A diminution in the quantity of urine passed, and a tendency to neutrality or alkalinity in the reaction, should make one doubly careful. In such cases, rest, purgation by saline aperients, and milk diet, and later, when improvement occurs, light diet with small quantities only of meat, are generally recommended. And of course it is only rational to recommend the patient to drink as much fluid as possible—so as to dilute and assist in the evacuation of metabolic products ; the skin should be made to act in the various ways, and care be taken *re* any exposure to draughts and cold and damp. As the Würtemberg statistics seem to show, acid, citrates and tartrates may be very useful ; at any rate, they can do no harm. So a vegetable diet should be encouraged, and fruit and the drinking of fluids containing citrates, etc. As in all case of renal trouble, the drinking of alcohol should be limited.

The amount of exercise should be regulated according to the nature of the case, and the urine examined frequently, both with regard to albumen, urea, quantity passed, and reaction.

If in spite of prophylactic treatment, the symptoms increase and tendency to headaches or stomach disturbances, etc. are added, induction should be considered.

I will now briefly consider the main kinds of treatment at present employed when once the fits have actually started :—

Medicinal.

Purgatives, Enemata, &c.—It is generally agreed that the best thing is, as soon as possible to relieve the bowels ; there is not in eclampsia the tendency to diarrhœa often seen in uræmic cases ; and especially in hospital cases, this treatment is very necessary. Some observers think that the alimentary canal has an important rôle in the causation of eclampsia. By purgatives also the blood-pressure is lowered. Saline aperients are certainly the best, if they can be given, in either threatened or actual cases of eclampsia.

Narcosis.—Scansoni, Veit, Schröder, Winckel, and others have written on this subject. Generally with narcotics the blood-pressure is lowered, and the sensitivity of the cortex

is diminished, and so the number of fits lessened or stopped. *Chloroform* is the agent usually employed. Schmorl has, however, pointed out the danger in its causing fatty changes in the heart, and says that it alone may account for some of the mortality. Still—when instruments are used—it is necessary. I think, however, that the A.C.E. mixture is worthy of a more extended use in these cases, as well as the combined administration of chloroform and oxygen.

Morphia is also very generally used when the symptoms are not very urgent ; some writers prefer morphia and chloral. Veit (quoted, Herman [30]) gives a series of 60 cases treated by narcosis alone, and only two deaths.

It must be remembered, too, that narcotics may only postpone the fits, as all the time the poison is accumulating in the system.

There are two methods which I think are worth a more extended consideration than they at present get in the treatment of eclampsia : one is *bleeding*, and the other *salines ;* the latter either by rectum, directly into the tissues, by the stomach, or intravenously, depending on the condition of the case. Bleeding is perfectly rational, as it lowers the blood-pressure, and removes some of the poison in the system ; then a saline infusion after bleeding dilutes the poison, and also probably promotes the elimination of poison by the kidneys. Then, in the analogous conditions of uræmia and diabetes, bleeding and subsequent infusion is one of the recognised methods of treatment.

Several cases have been reported in the last couple of years where good results have been obtained by the use of saline infusions. Reference may be made to the cases mentioned by Johnston,[33b] Lithgow,[39a] Fraser (*B. M. J.*, 1903), and McDowell (*B. M. J.*, July, 1903). Parke [52] and Abrahams,[1] in recent papers, both advocate this treatment, and the former also suggests the use of nitro-glycerine.

Hey-Groves [31] also advocates its more extended use, and mentions 47 cases where it was employed with a death-rate of 12·7 per cent.

Herman,[30] on the other hand, quotes figures from Chantreuil and Chambrelent giving an increased mortality, but these numbers refer to cases before 1872.

. The question as to whether it is always wise to reduce the arterial pressure is possibly an open one—the increased pressure may, as in renal disease, be partly a protective agency, perhaps to prevent the toxines getting to the tissues or to possibly eliminate them by a greater pressure of blood through the kidney ; but still, in eclampsia, with a lowered pressure, there does not seem to be the same tendency to fits. However this may be, whether the improvement noted by many be due to the lowered blood pressure or to taking away some of the poison, bleeding and saline infusions appear to be steadily coming more into favour. In post-mortems on eclampsia cases there is usually found not only a distended right ventricle, but, as I have seen in more than one case, an enormously distended right auricle.

The Thyroid Treatment.—Nicholson[48] recommends the use of extract of thyroid gland. It has been noted that usually in pregnancy the thyroid is enlarged, and it has been said that albuminuria is more frequent when the normal hypertrophy does not occur. He suggests that many of the cases of œdema in pregnancy are of that solid type usually associated with myxœdema.

Then, as is well illustrated by the foregoing, the oxidisation of the body is interfered with, and what probably act as poisons are the normal metabolic products which are unable to leave the body, which secondarily interfere with, chiefly the liver, and still further cause deficient metabolism. It is well known that the thyroid has a definite influence on metabolism, and both from this point of view and also that it acts as a diuretic, it is perfectly rational to employ it. Of course, until further statistics are available, it is difficult to say whether a theoretically good agent will turn out practically efficient, but the cases at present reported seem very favourable.

Sturmer,[67] 1904, mentions 41 cases of eclampsia treated with thyroid extract in Madras—the death rate was reduced to 12·2. Saline infusion and morphia were apparently used as well in many cases.

McNab[42a] mentions a favourable case of eclampsia treated by thyroid extract dissolved in saline and given subcutaneously.

In 1886 Britton suggested Pot. iodid. as a specific for puerperal albuminuria (*Lancet*, Vol. II., 1886, p. 1010, quoted

Nicholson). Nicholson also suggests it should be employed hypodermically in urgent cases ; the only immediate effect one would expect is that the blood pressure may be lowered.

Diaphoresis is also quite rational ; but here, as in renal disease, one must be careful one does not over-exhaust the patient with too active measures. Hot-air baths, if used, must be given carefully, keeping an eye on the patient's condition ; there is nothing to be feared from wet towels, sponging, etc., pilocarpine, if used at all, must be administered with the greatest care, and most writers are very much against its use under any circumstances.

The point which has given rise to so much discussion is whether, in the majority of cases, an "expectant" or an "active" treatment gives the best results ?

From theoretical grounds one would expect that the best thing to do was to get rid of the cause of the trouble as soon as possible ; but, on the other hand, with active treatment, with the exception perhaps of Cæsarian section, the disturbance of the already hyper-excited nervous system is enormously increased, chiefly by the manipulations necessary, and even if this be partially obviated by the use of chloroform, the disturbance to the degenerated kidney must be remembered. The question is, is it better to let the pregnancy take its normal course, treating by rest, narcotics, etc., the "*expectant*" treatment, or to terminate the pregnancy as soon as possible by "*active*" measures ?

Duhrssen says that in 89 per cent. to 90 per cent. of cases the fits stopped at the birth of the child, and at Zurich, Meyer-Wirz [44] found that they stopped in 70 out of 94 cases when the child was born ; on the other hand, Herman [30] collected a large number of cases and found the fits only stopped in 52·5 per cent. at birth; still, even then, there is less danger in the cases which extend to the post-partum period.

· Moraweck [45] and later Gessner (Gynæcological Congress, Giessen, 1901) are amongst the minority of writers who favour an expectant treatment, and say that in many cases not actively treated that the fits stop before delivery. Veit [72] and Ostrcil [51] also favour a more expectant treatment. So very much depends on the experience of the individual operator ; again, if one makes a collection of a large number of cases treated by the

"expectant" method, is it not probable that a large number of these are mild cases, perhaps cases which had a fit before entering the klinik, and with rest, etc., in the klinik did not have any more?

Fehling,[30] Wyder,[84] and many others agree that it is best, in the great majority of cases, to end the pregnancy as soon as possible after the commencement of the fits. Fehling goes so far as to say that spontaneous birth in any eclamptic patient means an error on the part of the physician.

Then Buttner[13] found a smaller percentage of deaths in those kliniks where there was active treatment than in those where spontaneous birth was allowed to take place—*e.g.*, 24·6 per cent. against 36·6 per cent.

Zweifel[87] found the following numbers in his klinik :—

Till January 1892, under "expective" treatment, 32·6 per cent. or less if 3 who died before any treatment could be adopted are considered, 28·5 per cent.

January 1892 till October 1895, during which period there was more active treatment, 15 per cent., or not counting 3 brought into klinik moribund—11·25 per cent.

Again, after 1900, when there was more expectant treatment, the mortality rose to 23·5 (this includes 4 who died soon after entering klinik, but were not actually moribund when brought in).

Glockner (*Archiv. f. Gyn.*, *Bd.* 63, 1901), with similar active treatment, also reports the mortality much reduced.

Again, Bumm,[11] 1903, gives the following numbers :—

47 cases, 1882–1895, narcotics (chloroform and morphia, and morphia + chloral) = 30 per cent. mortality.

43 cases, 1895–1900, narcotics (specially morphia) and diaphoresis (baths, packs, etc.) = 30 per cent. mortality.

25 cases, 1901 to publication of his paper—under active treatment = 12 per cent. mortality.

(And less if 1 case of pneumonia be eliminated.)

Zweifel[87] gives 84 cases treated at once actively after the first fit, and of these only 2 died, or 6·6 per cent., and he mentions that in Berlin of 162 cases (including 14 with twins), treated at once with forceps, turning, craniotomy (15 cases) and Cæsarian section (5 cases), the mortality was 16·9 per cent.

By active treatment in the above statistics is included induction, dilating the cervix with bags, etc.

Also in Olhausen's [30] klinik the immediate clearing out of the uterus has given very good results ; and he mentions 3 cases of Cæsarian section where on delivery the fits stopped at once.

Zweifel mentions two similar cases, and Halbertsma is also in favour of a more extended use of Cæsarian section, and it certainly seems worthy of being more employed where there is any mechanical obstruction from contracted pelvis, etc., rigid cervix, etc. Many observers are against Dührssen's [17] method of vaginal Cæsarian section on account of the risks in bleeding and sepsis.

So that going by statistics and by the experience of the majority of writers, the " active " treatment appears to give a smaller mortality than the " expectant," but, as mentioned above, I think a great number of lives can also be saved by the proper treatment of the albuminuria of pregnancy before it gets to the serious condition of eclampsia.

REFERENCES.

[1] Abrahams: "Venesection and Transfusion in Puerperal Eclampsia," *New York Med. Journal*, May, 1902.

[2] Albert : *Vortrag. a. d. Versammlung d. deutsch. Gesell. f. Gynæk.*, 1901.

[3] Alalykin: *Inaug. Dissert.*, Petersburg, 1892.

[4] Araki : "Ueber der Bildung der Milchsäure und Glykose in Organismus bei Sauerstoffmangel," *Zeit. f. Phys. Chemie*, Bd. 17, s. 453; Bd. 15, s. 335. "Ueber die Chem. Aenderungen der Lebensprocesse in Folge von Sauerstoffmangel," *Z. f. Phys. Chemie*, Bd. 19, s. 422.

[5] Ascoli : "Zur Exper. pathog. d. Eklamp.," *Cent. f. Gesell. Gynæk.*, No. 49, 1902.

[6] Bell: "A Case of Puerperal Eclampsia, with Autopsy and Remarks," *Journal of Obstet. and Gynæcology*, 1902.

[7] Blumreich: *Verhand. d. deutsch. Gesellsch. f. Gyn.*, Giessen, 1901, s. 344.

[8] Bouchard: *Gaz. Hebdomad.*, 1887.

[9] Bouffe de St. Blaise: *Thèse, Steinheil*, Paris, 1891 ; and *Ref. Cent. f. Gyn.*, 1899, No. 2.

[10] Bidder: *Archiv f. Gynækologie*, Bd 44.

[10] Bremme, W.: *Eklampsie bei mehrfachen Geburten*, D. in Leipsig, 1903.

[11] Bumm: *Münchn. Med. Wochenschrift.*, May, 1903, No. 21, s. 889.

[12] Buttner: "Die Eklampsie in Grossherzogthum Mecklenberg-Schwerin während der Zeit vom 1 Juli 1881 bis 31 Dec. 1891," *Archivus f. Gynækologie*, 65, 1902.

[13] Chambrelent: "Die Toxicität des mütterlichen u. d. fötalen Serums in einem Falle v. puerp. Eklampsie," Ref., *Cent. f. Gynæk.*, No. 27, 1896.

[14] Deuchars and Regnault: *Archives Générales*, 1848.

[15] Dienst: "Kritische Studien u. die Pathogenese der Eklampsie, etc.," *Archives f. Gynäkologie*, 1902, Bd. 65; *Verhand. deutsch. Gesell. f. Gynäk.*, 1901.

[16] Drullmann: "Beiträge z. Frage der Urinsecretion dei Foetus," *Inaug. Dissert.*, Marburg, 1899.

[17] Dührssen: "Ueber Eklampsie," *Archiv. f. Gynäk.*, Bd. 43, 1893; "Ein neuer Fall v. Vaginal Kaiserschnitt bei Eklampsie nebst Bemerkungen u. d. Behandlung d. Eklampsie," *Archiv. f. Gynäk.*, Bd. 61, 1900.

[18] Edinger: "Ein Beitrag zur Statistik, Prognose, u. Behandlung der Eklampsie," *Inaug. Dissert.*, Kiel, 1900.

[19] Eskelin: "150 Falle d. Eklampsie," *Ref. Central. f. Gynäk.*, 1898, s. 977.

[20] Fehling: *Die Pathogen. u. Behand. d. Eklamp. in Lichte der heutige Anschau*," Leipsig, 1899; "Behand. d. Eklamp.," *Therap. Monat.*, XVI., 4, 1902.

[22] Feis: Ueber d. Complic. v. Schwangerschaft, Geburt u. Wochenbett bei chronisch. Hertzfehler," *Samml. Klinish. Vorträger v. Volkmann*, No. 213, Leipsig, 1898.

[23] Frerichs: *Die Bright'she Nierenkrankung u. deren Behandlung*, Braunschweig, 1851.

[24] Glockner: "Ueber Beziehungen zwischen d. Puerp. Eklamp. u. der Epilepsie," *Verhand. d. deutsch. Gesell. f. Gynäk.*, 1901.

[24a] Griffith and Eden: "Note on a Case of Puerperal Eclampsia, with a description of a Five-weeks' Ovum removed in a subsequent Pregnancy," *Journal of Obstetr. and Gynaecology*, 1899.

[25] v. Goedeké: *Zeitschrift f. Geb. v. Gynäk.*, Bd. 45, 1901.

[26] Gotschalk: "Beitrag z. Lehre v. d. Eklamp.," *Wien Verhand.*, 1895.

[27] Hahn, Massen, Nencki, u. Pawlow: *Archives des Sciences biologiques de l'institut impériale d. St. Petersburg*, 1892; *Archiv. f. Exper. Path. u. Pharmak.*, 1893.

[28] Halbertsma: *Centralblatt f. d. Medic. Wissenschaften*, No. 27, 1871.

[29] Harig; *Inaug. Dissert.*, Tübingen, 1901.

[30] Herman: Allbutt's *System of Medicine*, Vol. VII.

[31] Hey Groves: "The Pathology and Treatment of Puerperal Eclampsia, with special reference to the Use of Saline Infusions," *Obstetr. Soc. Transact.*, 1901.

[32] Ingeralev: *Zeit. f. Geburt u. Frauenkrankh.*, 6, s. 171.

[33] Irisawa: "Ueber die Milchsäure in Blut u. Harn," *Zeit. f. Phys. Chemie*, Bd. 17, 1892-3.

[33a] Jaccoud: *Gaz. d. Hôpitaux*, No. 17, 1886.

[33b] Johnson: "Saline Infusion in Eclampsia," *Brit. Med. Jour.*, May, 1903.

[34] Jürgens: "Beiträge zur Pathol. der Leber," *Naturforscherversammlung in Berlin*, 1886.

[34a] Kattenbach: *Lehrbuch d. Geburtshülfe*, Stuttgart, 1893, s. 352.

[34] Klebs: "Beiträge zur Path. Anat. u. Allgemein. Pathol.," *Zeyler u. Neuwerck*, III.

[36] Krönig: "Experiment. Untersuchungen z. Ætiol. der Eklampsie," *Verh. d. deutsch. Gesellsch. f. Gynäk.*, Giessen, 1901.

[37] Krönig und Füth: "Vergleich. Untersuch. über den Osmotischen Druck in Mütterlichen u. Kindlichen Blute," *Monatsch. f. Geburt. u. Gynäk.*, Bd. 73, Ht. 1 and 2.

[38] Kolman: "Zur Ætiologie u. Therapie d. Eklampsie," *Dorpat Centralblatt f. Gynäk.*, 1897, s. 341.

[39] Lever: *Guy's Hospital Reports*, 1843.

[39a] Lithgow: "Treatment of Puerperal Eclampsia by a Combined Method," *Brit. Med. Journ.*, March, 1904.

[40] Lohlein: "Bemerk. z. Eklampsiefrage," *Zeitsch. f. Geb. u. Gynak.*, VI., 1881.

[41] Lubarsch: *Centralblatt f. Allgemein. Pathol. u. Path. Anatomie*, II., No. 19, 1891. "Ueber die Path. Anatomie der Eklampsie," *Correspondenzblatt d. Allgemein Mecklenberg. Aerztvereins*, 1892, and *Ergebnisse d. Allgemein Pathol.*, 1895: "Puerp. Eklampsie," *Ergebnisse d. Allgemein. Pathol. des Menschens u. der Thiere*, Bd. I., Bergmann, Wiesbaden. *Verhand. d. deutsch. Gynah. Versammlung*, 1901.

[42] Martin: "Zur Pathol. d. Placenta," *Centralblatt f. Gynak.*, XXIV., 1900.

[42a] Macnab: *Journal of Obstetrics and Gynæcology*, November, 1904.

[43] Massen: *Centralbl. f. Gynak.*, s. 1108, 1895.

[44] Meyer-Wirz: "Klinische Studien u. Eklampsie," *Archiv. f. Gynak.*, 1904, Heft I.

[44] Moraweck: "Ueber Eklampsie," *Dissert.*, Berlin, 1898.

[45] Müller: *Die Massenverhältniss d. menschlichen Herzens*," Hamb., Leipsig, 1883.

[47] Müller: "Ueber die Entstehung der Eklampsie," *Archiv. f. Gynak.*, Bd. 65, Heft II., 1902.

[48] Nicholson: *Transact. Edin. Obstet. Society*, Vol. XXVI., 1900–01; "Thyroid Extract in Eclampsia," *Journal of Obstetrics and Gynæcology*, Vol. II., 1902.

[49] Neumeister: *Lehrbuch d. Physiol. Chemie*, 2. Aufl, Jena, 1897, s. 648, &c.

[50] Olhausen: *Verhand. d. deutsch. Gesellsch.*, Giessen, 1901, s. 543, etc., and 559.

[51] Ostreil: *Archiv. f. Gynak.*, Bd. 67, 1902.

[52] Parke: "Treatment of Puerperal Eclampsia," *New York Med. Journal*, May, 1902.

[53] Pels-Leusden: Virchow's *Archiv.*, Bd. 142, Heft I., 1895; "Beitrag zur Pathol. Anat. v. Puerp. Eklamps.," Virchow's *Archiv.*, Bd. 141.

[54] Pestalozza: *Refer. Jahresbericht für Geb. u. Gynak.*, 97.

[55] Pfannensteil: *Centralblatt f. Gynakol.*, 1887.

[56] Pilliet: *Nouv. Archiv. d'Obstétr. et de Gynæc.*, 1884 and 1888; Pilliet et Letienne, 1889; Pilliet et Morel, 1890; *Gazet. Hebdomad*, 1890; *Nouv. Archiv. d'Obstétr.*, 1890.

[57] Politi: *Archivio di Obstetricia e Ginecologia*, 1903.

[58] Prutz: *Ueber das anatomische Verhalten der Leber bei d. Eklampsie*," D. in Königsberg, 1892. "Ueber das Anatom. Verhalt. der Niere bei Puerper. Eklampsie," *Zeit. für Geb. u. Gyn.*, Bd. 23.

[59] Rosenstein: *Die Pathologie u. Therapie der Nierenkrankheiten*," Berlin, 1863, s. 52, etc.; *Die Schwangerschaftsniere*, s. 96, etc., Berlin, 1894.

[60] Sandberg u. Limfors: *Nordisk. Archiv. Festschrift f. Axel Key.*

[61] Schaller: "Ueber Phoridzin Diabetes bei Schwangeren," *Arch. f. Gyn.*, B. 57, s. 566.

[62] Schmid: "Eklamp. bei Mutter u. Kind," *Centralb. f. Gynak.*, 1897.

[63] Schmorl: *Pathol.-Anat. Untersuchungen über Puerperal-Eklampsie*, Leipsig, 1893; *Central. f. Gynak*, 1900, No. 49.

[64] Schroeder: "Ueber Blutdruck u. Gefrierpunctbestim. bei Eklampsie," *Verhand. d. deutsch. Gesell. f. Gyn.*, 1901.

[65] Sinclair and Johnson: Ref., *Monatsch. f. Geb.*, Bd. 14, s. 394.

[66] Stumpf: *Verh. d. deutsch. Gesell. f. Gyn.*, 1886, s. 161, etc.

[67] Sturmer: "Forty-one Cases of Puerp. Eclampsia treated by Thyroid Extract," *Jour. of Obstet. and Gynæc.*, 1904.

[68] Schumacher: *Verh. d. deutsch. Gesell. f. Gynak. in Giessen*, 1901; *Beitrag z. Geb. u. Gyn.*, Bd. V., 1901.

[69] Stroganoff: *Zeit. f. Geb. u. Gyn.*, Bd. 12, H. 4; *Centralblatt f. Gynak.*, 1901, s. 1309.

[70] Trautenroth : *Zeit. f. Geb. u. Gyn.*, Bd. 30, s. 241.

[71] Van der Bergh : " Ueber d. Giftigkeit der Harns," *Zeit. f klinish. Medic.*, Bd. 35, 1898.

[71a] Van de Velde : Ref. in Frommel's *Jahresbericht*, 1897, s. 751.

[72] Veit : *Central. f. Gynak.*, 19, 1895.

[73] Volhardt : *Monatschrift f. Geb. u. Gyn.*, 1897.

[74] Vaquez et Nobécourt : " Pressure artérielle dans l'Éclampsie puérperale," *Soc. Méd. des Hôpitaux*, 1897.

[75] Weichardt : " Exp. Studien v. d. Eklampsie," *Deutsch. Med. Wochenschrift*, No. 35, 1902; " Ueber Syncytiotoxine," *Hyg. Rundschau*, XIII., No. 10.

[76] Wendt : *Archiv. f. Gynak.*, Bd. 56.

[77] Wessner : "Chronisch. Herzkrankheit in Puerper.," *Inaug. Dissert.*, St. Gallen, 1884.

[77a] Whitney and Clapp: " Urine, Changes in Pregnancy, and Puerp. Eclampsia," *Amer. Gynæcol.*, August, 1903.

[78] Wiessner : " Ueber Blutdruckmessungen während d. Menstruat. u. Schwangerschaft," *Cent. f. Gynak.*, 1899.

[79] Wilke : " Ein Fall v. Encephalitis d. Kindes bei Eklampsie d. Mutter," *Cent. f. Gynak.*, 1893, No. 17, s. 385, *et seq.*

[80] Wilson : " A Case of Primary Pneumococcal Meningitis Simulating Eclampsia," *Obstet. Soc. Transact.*, 1902.

[81] v. Winckel : *Lehrbuch d. Geburtshülfe*, 1899 and 1893, Leipsig.

[82] Winckler : " Beiträge z. Lehre u. d. Eklampsie," *Virchow's Archiv.*, CLIV., 21, 1898.

[83] Wooldridge : *The Coagulation of the Blood.*

[84] Wyder : Ref., *Versamml. d. Deutsch. Ges. f. Gynak.*, 1901.

[85] Zangemeister : *Zeit. f. Geburt. u. Gyn.*, Bd. 50, II. 3, 1903; *Zeit. f. Geburt. u. Gyn.*, 1901.

[86] Zillensen : " Ueber d. Bilding v. Milchsäure u. Glykose in den Organismus bei gestörter Circulation u. bei der Bleisaürevergiftung," *Zeit. f. Phys. Chemie*, 1892.

[87] Zweifel : " Zur Aufklärung der Eklampsie," *Archiv. f. Gynak.*, 1904.

SOME ASPECTS OF THE SERUM TREATMENT OF DIPHTHERIA.

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I PROPOSE to give an account of the non-therapeutical sequelæ of diphtheria antitoxin [1] which I have observed during the treatment of 600 cases of diphtheria that have been under my care at the Grove Hospital.

These may be conveniently dealt with under the head of A. Skin, B. Urine.

A.—SKIN.

After an interval of from one to two hours, severe pain may be felt at the site of injection, and tenderness may persist for several days. The pain can usually be relieved by hot fomentations.

In many severe cases, where a large bulk of fluid has been given at one time and in one place, very little or indeed no pain results. The injection seems to have a sedative effect. It is by no means uncommon to find that after massive doses, not only children but also adults sleep or are drowsy for the next two or three days.

The behaviour of patients, especially young children, during injection is often of prognostic value. The absence of any protest, or of any tendency to struggle or cry, or at most a look of languid annoyance, is characteristic of a severe attack, and well accords with the general apathy met with in such cases. On the other hand obstreperous conduct during injection is a favourable sign. Subsequent restlessness is rare except in toxæmic cases, and is therefore of bad omen.

In malignant forms of diphtheria in which there is a general tendency to hæmorrhage, not only do petechiæ appear early

[1] It must be borne in mind that the ill-effects of diphtheria antitoxin are in no way due to the antitoxic principle, since they may follow the injection of normal horse's serum.

at the injection site, but hæmatomata are also very liable to develop there, and to increase in extent for some days.

Of all the manifestations of antitoxin the rashes are those which are the most striking and will now be considered.

Frequency of Rashes.—The relative frequency of antitoxin rashes has been variously estimated by different observers.

Table I. shows the percentage met with in the hospitals of the Metropolitan Asylums Board since 1896.

<div align="center">TABLE I.</div>

Number of Cases treated with Antitoxin.	Year.	Percentage of Rashes.
483	1896	35·2
—	1897	No record.
5,170	1898	45·00
7,147	1899	34·50
7,280	1900	42·60
6,495	1901	43·6
6,015	1902	47·46
5,170	1903	44·80

My own figures give a considerably higher percentage.

<div align="center">TABLE II.</div>

Number of Cases treated with Antitoxin.		Percentage of Rashes.[1]
95	1st series	69·4
94	2nd ,,	79·7
93	3rd ,,	77·41
97	4th ,,	67·01
94	5th ,,	81·9
95	6th ,,	70·52

It is probable that the difference in the numbers given by various observers, though undoubtedly due in many cases to different brands of serum and the idiosyncrasies of individual patients, is in part owing to the fact that a certain number of rashes escape observation, being but ill-marked and very transient.

Relation of Rashes to Dose.—The frequency and intensity

[1] These figures refer to urticarial rashes only.

of rashes and other serum phenomena are in direct relation to the size of the dose, and in inverse relation to the character of the diphtherial attack. This statement is confirmed by Table III., which shows that the percentage of rashes rises with the severity of the case till Class II. is reached, when there is a decided fall, which becomes more marked in Class I.

This fall cannot be entirely explained by the fact that some patients died before the rash had had time to develop, since of 32 cases that died without a rash, nearly half the deaths occurred after the usual time for the urticarial rash to appear.

TABLE III.

	Number of Rashes.	Percentage
Class V.—" Mild "	133	73·8
Class IV.—" Moderate "	130	77·3
Class III.—" Moderately severe "	44	86·2
Class II.—" Severe "	76	66·8
Class I.—" Very severe "	24	48·0

Each of the five classes, which represent cases of various degrees of severity, received doses ranging from 3,000–12,000 units for the mild forms, to 63,000–78,000 units or more in the severest.

It is thus evident that in Classes V. to III. the frequency of the rashes bears a direct relation to the size of the dose, the slight increase in severity of Class IV. over Class V., and of Class III. over Class IV. being not sufficient to counteract the tendency for rashes to be progressively more frequent as the dose is increased. In Class II., however, and still more so in Class I., the severity of the attack overbalances the increased dosage and rashes beecome less frequent.

Varieties of Rashes.—Though the antitoxin used in the hospitals of the Metropolitan Asylums Board is still prepared in the laboratories of the Royal College of Physicians and Surgeons, the character of the rashes has changed since Stanley[1] wrote his paper, which was based on cases injected with serum obtained from the same source. At that time a circinate erythema, associated with pyrexia and constitutional

[1] *Brit. Med. Journ.,* February 19, 1902.

disturbance, was more common than any other eruption ; next most frequently urticaria was met with.

Now exactly the reverse holds good. Urticaria, usually attended by no rise of temperature or any malaise beyond that directly due to pruritus, is by far the most frequent eruption. Circinate rashes are much less commonly noted. A morbilliform type of rash, described by authors, is now rarely found as a separate variety, but merely as a precursor of, or as an associate in, an amorphous form of the circinate erythema, by which it is entirely replaced shortly after it has appeared.

There remain three chief forms of antitoxin rashes—(*a*) a scarlatiniform type, (*b*) an urticarial type, (*c*) a circinate erythema type. Each of these tends to occur at a definite period after injection.

The scarlatiniform type may either be localised or general in distribution. In the latter case it is less common than either of the other two types, and its origin cannot always be attributed to antitoxin. It is most apt to occur within the first few days from injection, and is commonly limited to the injection site.

In skins that perspire freely, miliaria often develops, leaving as it fades a well-marked desquamation.

If the temperature has already become normal it is not raised again by the eruption. There are no other symptoms, except occasionally slight itching, but as a rule the patient is not aware of the presence of a rash till his attention has been called to it. The connection with antitoxin of scarlatiniform rashes, especially when generalised, is a disputed one. In the first place it must be borne in mind that in pre-antitoxin days scarlatiniform eruptions were described as occurring in diphtheria, notably by Germain Sée.[1] Many of these cases, occurring as they did before the discovery of the Klebs-Lœffler bacillus, were simply scarlatina anginosa, but it is possible that some were unadulterated diphtheria. Even now a flush on the trunk, resembling the eruption of scarlatina, is met with in cases of genuine diphtheria before they have received antitoxin, and is often described as a " blanket rash."

Oppenheim and Lœper[2] state that the diagnosis may be

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[1] Sanné: *Diphtérie*, 1877.

[2] *Gazette des Hôpitaux*, May 25, 1901

settled by Ehrlich's diazo-reaction, which is positive in scarlet fever and negative in serum eruptions.

The inconstancy, however, in scarlet fever of a positive reaction, which I have met with in only 50 per cent. out of a large number in which I have employed the test, makes this an untrustworthy guide.

In hospital practice the real nature of the eruption is often revealed by the simultaneous occurrence in different wards of scarlatiniform rashes following the use of a special brand of serum.

I have elsewhere [1] alluded to a special form of scarlatiniform eruption localised to the extensor aspects of the elbows and knees, which is frequently met with in severe attacks of diphtheria, and is probably not due to antitoxin.

Usually drugs can be excluded from the causation of a scarlatiniform eruption occurring in diphtheria, but the possibility of their giving rise to such should be remembered ; for instance, antipyrin may have been administered for the initial headache or salicylates for the sore throat.

It is less easy to exclude enemata from the ætiology of such rashes. An enema, especially when long retained, may sometimes produce a bright scarlet rash on the trunk and limbs, and it is often difficult to determine, when the patient has had an enema within 24 hours, whether the rash is due to the enema, to the serum, or to scarlet fever. As a rule, however, the character of an enema rash is very different from that of scarlatina, and consists of a coarse papular eruption which first appears on the buttocks and flexor aspects of the thighs, and thence becomes generalised, being often very marked upon the face, which is usually spared by scarlet fever.

Urticaria may appear any time after injection. It is rare, however, except when antitoxin has been given some weeks or months before, for the eruption to appear on the same day, or on that following, injection.

In cases of relapse, or of a second attack of diphtheria, the serum reaction may be very marked. A very profuse urticarial eruption, with pronounced œdema surrounding the wheals, vomiting, rigors, and collapse, may ensue within a few

[1] THE PRACTITIONER, December, 1904.

hours of injection. Such disagreeable phenomena are more liable to occur after large doses than small ones, and therefore, to prevent their occurrence, a relapse case, if antitoxin has been given for the primary attack, should be re-injected early, so that a small dose should be sufficient.

With 17 exceptions, 11 of which were scarlatiniform rashes and 6 circinate erythemata, 289 rashes, that appeared from the 1st to 10th day inclusive, were urticarial. The later 94 rashes with 10 exceptions, which were urticarial, were cases of circinate erythema, usually associated with pyrexia, sometimes with adenitis, and pains in the joints or muscles.

The days of predilection for the appearance of urticaria are the 7th and 8th from injection. By this time the initial pyrexia, due mainly to diphtheria, and in a less degree to the injection, has as a rule subsided, and the temperature is only exceptionally raised on the appearances of the rash. Beyond the irritation associated with urticaria there are rarely any other symptoms.

Gastro-intestinal disturbance is so uncommon as to be regarded as a mere coincidence.

In a few cases pains in the joints are met with at this stage, but they are not so severe or so persistent as they are apt to be later.

The first appearance of an eruption may be delayed for as long as three weeks from the time of injection, but it is exceptional for the first manifestation of an antitoxin rash to take place after the end of the first fortnight.

Urticaria first appears on the abdomen close to the injection site, whence it spreads over the rest of the trunk and the limbs. Sometimes only a single wheal may appear, or the eruption may be confined to the abdomen, but in most cases the eruption becomes generalised.

The irritation produced by the eruption is in some cases trifling or entirely absent, but in others, especially in patients of a neurotic temperament, it becomes a torture.

Not unfrequently it is worst at night and causes insomnia.

The duration of serum urticaria varies within somewhat wide limits. Successive crops may appear daily, and even several times in the twenty-four hours, for as long as ten days, but as a rule the rash is more short-lived.

The average duration in 407 case of urticaria was 3·9 days.

Before its final disappearance there may be an interval of one or more days during which no rash is noted.

Relation of Urticaria to Age and Sex.—Urticarial rashes are fairly equally distributed throughout each age period. The percentage of males affected was 68·5 ; that of females, 59·6.

Circinate Erythema or Secondary Rash.—When the urticaria has disappeared an interval usually elapses before any fresh serum phenomena occur. So exceptional is it for the latter not to have been preceded by urticaria, that I am inclined to regard such apparent exceptions as due to the fact that the primary rash has been so transient or ill-marked, occurring, for example, in the night, as to have escaped the notice of the doctor, patient, or nurse.

At a period varying from the tenth to eighteenth day from injection, very rarely later, a symptom complex in a certain number of cases arises, which may be described as secondary-rash phenomena. They consist in the efflorescence of an eruption, at first amorphous, subsequently becoming circinate ; pyrexia with more or less constitutional disturbance, pains in the joints, muscles, or fasciæ, and an adenitis of the submaxillary and cervical glands, in rare instances of the axillary and inguinal groups as well. The rash usually first appears on the knees and elbows, or on the inner side of the thighs, and though occasionally it remains limited to these sites, as a rule, spreads thence over the rest of the limbs and invades the face and trunk.

The rings of the erythema are at first quite small, but gradually enlarge, so that by the second or third day of the eruption they measure a half to one inch in diameter. A variable amount of staining of the skin is left when the rash fades, which lasts for a few days and may be followed by a slight degree of branny desquamation.

In some cases there is no interval between the disappearance of the urticarial eruption and the efflorescence of the secondary rash. Both may coexist. Not unfrequently there is a transition period in which circinate erythema may be found on the limbs and patches of urticaria on the trunk, or the urticarial wheals may assume a gyrate form, and the following day the rings persist, but the rash is no longer raised. On its first

appearance the rash may simulate measles, especially on the face, where as a rule the circinate rash is never well marked. The injected conjunctivæ and bloated features add to the resemblance, but the absence of Koplik's spots and of catarrhal symptoms, and the co-existence or subsequent appearance of a circinate rash elsewhere point out the true nature of the eruption.

In a few cases in addition to a circinate erythema there may be several petechiæ or even extensive ecchymoses which are chiefly met with on the limbs, more rarely on the trunk. The constitutional disturbance is then considerable, the joint pains are apt to be very distressing, and the temperature may range between 102°—103° for several days. As a rule the duration of the circinate eruption is the same as that of urticaria. The average duration of 108 cases was 3·8 days.

Joint Pains.—The joints affected are usually those most commonly involved in rheumatic fever, namely, the shoulders, elbows, knees, and ankles. Less commonly are the vertebral, sterno-clavicular and temporo-maxillary articulations attacked.

Joint pains by no means invariably accompany the secondary rash. The relative frequency of the two phenomena is shown in Table IV. Quite exceptionally joint pains may be the only manifestation of a serum reaction in the second week from injection.

The other elements of the symptom complex may be similarly dissociated, though this too is unusual. Thus a circinate rash may appear and run its courses without any pyrexia, or the temperature may be raised for a few days without anything to account for it. Adenitis of the glands at the angles of the jaw may also be met with as an isolated phenomenon, but in such a case it is almost impossible to attribute its occurrence with certainty to the serum.

Almost, if not quite, as frequently as in the joints themselves, pain is complained of in the muscles and fasciæ, especially those of the thigh and forearm.

Adenitis.—Though only slightly less common than pain in the joints, adenitis as a serum complication has received but little attention. The submaxillary and cervical glands are as a rule alone involved. Occasionally the axillary and inguinal groups are also affected, but not to the same extent. The

inflammation usually is moderate in degree, and ends in complete resolution. Suppuration is an occasional but rare termination.

Pseudo-relapses.—Usually there is nothing to account for the adenitis, in the condition of the fauces, which are quite clean, not injected but dry, or with a little sticky mucus hanging about them, such as may be found in any febrile state. Occasionally, however, they are injected, specks of deposit may be seen upon the tonsils, and even a continuous exudation. Such appearances, which have been described by French writers as pseudo-relapses,[1] I have observed in a few cases; it being always my practice to examine the throat at the time of the secondary rash.

TABLE IV.

Number of Cases treated with Antitoxin.	Percentage of Secondary Rash.	Joint Pains.	Adenitis.	Pyrexia.
First series - - 95	17·6	7·15	11·5	14·8
Second ,, - - 94	23·4	13·8	10·6	20·2
Third ,, - - 93	16·12	11·83	3·2	7·5
Fourth ,, - - 97	26·8	15·4	11·3	23·7
Fifth ,, - - 94	12·7	7·4	10·6	14·8
Sixth ,, - - 95	15·7	5·26	3·15	13·3
Grand total - - 568	19·08	10·24	8·48	15·01

Frequency of Secondary Rashes, &c.—A comparison of the above figures with those in Table II. shows that secondary rashes are much less common than are the primary or urticarial eruptions. Of the concomitant symptoms, pyrexia is the most constant, next come joint pains, and last adenitis.

Though uncommon after small doses, secondary rashes and the allied phenomena are equally rare after a massive injection, and relatively most frequent after a medium dose.

To a certain extent there seems to be an individual susceptibility at work.

Undoubtedly of more importance than the idiosyncrasy of

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[1] " Angines de retour " is the felicitous expression used in Weill and Deguy's work, *Traitement de la Diphtérie.*

the patient, is the character of the serum used. In 108 cases of secondary rash there were only seven instances of a given brand affecting only one patient. From time to time a brand has been found to produce results sufficiently severe to prevent any more of it being used.

Relation of Secondary Rashes to Age.—The average age of 108 patients who developed a secondary rash was 8·0 years.

As considerably more than half of my diphtheria cases were below 8—407 out of 600—this may be regarded as a relatively advanced age, and accords with the fact that young children suffer less severely than older patients from the late manifestations of the serum. In the former, beyond the elevation of temperature, there may be little or no disturbance during the period of the secondary rash.

The tongue may keep clean, the appetite be preserved, and sleep not be disturbed. Very young children rarely suffer from joint pains. The average age of 58 patients in whom arthralgic and myalgic symptoms were noted was 9·68 years.

Relation of Secondary Rash to Sex.—Secondary rashes were noted in 44 males—a percentage of 15·7—and in 64 females—a percentage of 20·0.

Antitoxin Abscesses.—The occurrence of abscesses at the site of injection is a very unwelcome event, not only because it suggests a discreditable lack of antisepsis, but also from the length of time the abscesses take to heal.[1] They are perhaps most apt to occur when a large bulk of fluid has been given in one place.

Abscesses usually do not appear before the end of the first week from injection, but occur simultaneously with the urticarial rash. In one case, however, an abscess was met with as early as the 3rd day from injection, being followed 3 days later by urticaria.

In another the abscess did not appear till the 21st day from injection, and was the only serum complication, though the patient had received 39,000 units in doses of 18,000 and 21,000, on two successive days.

Abscesses are sometimes associated with other severe serum phenomena, such as suppurative adenitis, circinate erythema

[1] In 10 cases the average time was 22 days, the longest 48 days, the shortest 12 days.

with joint pains and pyrexia, lasting for several days, and a hæmorrhagic eruption with œdema of the limbs.

Hyperidrosis.—Less striking than the rashes but as common a result of serum treatment is the excessive activity of the sudoriparous glands. Though a frequent occurrence in recently injected cases, it is not one which is generally known, and therefore deserves special notice.

Within a few hours of injection, especially if a large dose has been given, and coincident with the sleep or somnolence that so often ensues, the skin in well marked cases becomes bathed in perspiration, and may so remain for two or three days. All the degrees of perspiration that separate a dry from a moist skin are to be met with. When the symptom is sufficiently pronounced to merit the title of hyperidrosis, it is often associated with an unusually rapid disappearance of membrane from the fauces, thus indicating that the individual is particularly susceptible to the action of antitoxin. The phenomenon is of special interest not only because it is the first serum manifestation, but also because it is of good prognosis.

Treatment of Rashes.—The irritation produced by urticaria can be most effectually relieved by a menthol ointment (menthol ℥ j, Par. alb. moll. ℥ j). The cutaneous hyperæmia is markedly diminished by the application, so that the wheals sink almost to the level of the surrounding skin. Carbolic lotion, which is sometimes recommended, should be shunned, for after a momentary alleviation of the pruritus caused by the eruption, there is superadded the characteristic tingling due to carbolic acid.

Preparations of morphia and opium, which the distress and insomnia might suggest, should also be avoided, since, so far from soothing the irritation, they stimulate the activity of the skin.

For pain in the joints glycerine of belladonna fomentations are useful. Much relief is derived from immobilising the limbs in splints. The exhibition of salicylates in this condition is disappointing.

B.—URINE.

Oliguria, lasting from 2 to 3 days with a relative increase of urates and phosphates, is the habitual result of the use of

anti-diphtheritic serum.[1] This is due not to diphtheria nor to the associated pyrexia, being found after injection both in non-diphtheritic patients and animals and in cases of bacteriological diphtheria with no pyrexia.[2] The phenomenon is often associated with hyperidrosis.

It is met with again during the presence of urticaria and the secondary rash. The oliguria due to serum can be differentiated from that found in malignant diphtheria in which the secretion may be diminished and even suppressed, not only by the faucial exudation, general condition of the patient, and abundant albuminuria, but also by the entire absence of idrosis.

Albuminuria.—The introduction of antitoxin treatment was followed by a striking increase in the number of albuminuric cases, the percentage rising from 24·1 in 1894, to 41·5 in 1895, and 53·4 in 1896.[3]

Albuminuria has always been present in the great majority of fatal cases, so that the survival of a greater number than before in consequence of antitoxin cannot account for the increase in albuminuric cases, as in the number of paralysis cases, or only to a slight degree. The increase therefore seems to be due to a greater incidence of albuminuria among the less severe cases. It may also be explained to a certain extent by the fresh interest in diphtheria and consequent more careful clinical observation aroused by the new treatment. Abstention from specific treatment nowadays is relatively so uncommon that the figures available are but small. Thus out of my 600 cases in only 28, *i.e.*, 4·6 per cent. was antitoxin deemed unnecessary.

Table V. shows that the incidence of albuminuria in Class VI., in which such cases were placed, was considerably lower than that in any other class, and that its frequency increases with the severity of the attack. The dose of antitoxin, however, was progressively higher from Class V. to Class I., so that serum cannot be excluded from the causation of this increase.

[1] Thus the amount of urine passed by a child aged 7 may be reduced to 8, 6, or even 4 ounces in the 24 hours.

[2] Variot: *La diphtérie et la Sérumthérapie.*

[3] *Metropolitan Asylums Board Reports.*

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TABLE V.

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Number and percentage of albuminuria cases in each class :—

				Number of Cases.	Percentage.
Class VI.	-	-	-	4	16·6
Class V.	-	-	-	44	30·5
Class IV.	-	-	-	67	44·7
Class III.	-	-	-	25	62·5
Class II.	-	-	-	77	82·08
Class I.	-	-	-	40	97·5

Among these cases patients who hitherto had had no albumen in the urine were found to develop it at the time of the rash, and pre-existing albuminuria was much increased by the skin affection in a frequency that varied from 10·25 in one series of a hundred cases to 27·27 in another. After the disappearance of the eruption the albumen either disappeared entirely or diminished considerably.

Though albuminuria has thus been shown to be due to serum in a certain number of cases, this fact in no way contra-indicates the use of antitoxin in diphtheria. In those cases where albuminuria could be imputed to the use of serum, the amount of albumen was not more than "a cloud" or "a trace," never amounting to that curdy deposit which could be measured by an albuminometer. It has been pointed out by Variot [1] and Goodall [2] that the existence of chronic nephritis is no contra-indication to the administration of antitoxin. My experience of chronic Bright's disease associated with diphtheria is limited to two cases, but in neither of these did the occurrence of a general urticarial eruption increase the pre-existing albuminuria or produce other untoward symptoms.

Prognostic Value of Antitoxin Phenomena.—It may be laid down as a general rule that the more marked the antitoxin reaction, the better is the prognosis. [3]

It may be added that a good development of the later antitoxin phenomena is of more value in this respect than that

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[1] *La Diphtérie et la Sérumthérapie.*

[2] *Encyclopædia Medica,* Art. "Diphtheria."

[3] *Cf.* THE PRACTITIONER, December, 1904, p. 795.

of the earlier. Thus drowsiness, oliguria, and hyperidrosis, though of good omen, are of less importance than a well-marked urticarial eruption.

Of the three former symptoms hyperidrosis is the most significant, and justifies a better prognosis than does the presence of either or both of the other two.

A skin that remains dry after repeated large doses of antitoxin is characteristic of a severe attack, and is often followed by a complete absence or deficiency of other serum phenomena, and the onset of early and fatal paralysis.

Drowsiness is almost invariable, except in toxæmic cases, who die within the first few days of the disease, and therefore by no means precludes the possibility of cardiac paralysis occurring within the first fortnight. In only 6 out of 26 deaths from toxæmia and cardiac paralysis, was urticaria noted. Two of these cases belonged to Class I., and died on the 10th day from injection. In the one the rash was confined to the injection site, in the other it was generalised. The remaining 4 patients belonged to Class II. Two of these died more than six weeks after injection, and had a generalised eruption. In the other two, who died within the first fortnight, the rash was limited to the abdomen. Even in the three cases of generalised eruption, though the pruritus was intense, the wheals were small and had no erythematous areolæ.

The absence or deficiency of a serum reaction in fatal cases, and in many severe cases that recover, is probably to be explained by the profound vaso-motor depression due to the toxines of diphtheria. A striking parallel is to be found in certain malignant forms of small-pox, in which mal-development of the pustules, and an absence of any inflammatory reaction in the surrounding skin, have long been noted as of evil omen.[1]

Among the cases of cardiac paralysis no death occurred later than the 12th day from injection. None of the urticarial rashes noted in the fatal cases were followed by circinate erythema or other symptoms characteristic of a late serum reaction. Though the period of predilection of the appearance

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[1] The more regular and the more genuine the disease is, the more do the pustules and the interspaces accurately exhibit a florid colour like that of the damask rose.—Sydenham : *Medical Observations.*

of the secondary rash is from the 12th—14th day from injection, it may occur as early as the 10th day. There would thus have been time for it to have developed in some of the fatal cases. The possibility of cardiac paralysis after the 12th day from injection becomes smaller daily. It is true that the onset of late cardiac paralysis in diphtheria is by no means unknown, but this must be decidedly exceptional if proper care is taken. The appearance then of a secondary rash and its concomitant symptoms is of excellent augury as regards the life of the patient. It is also an indication that any subsequent paralysis will not be severe.

Out of 147 paralysis cases, which included 56 severe forms, secondary rashes occurred 61 times (56·4 per cent.). In only 9 of these 61 cases was the paralysis extensive (16·07 per cent.). None of the paralyses were fatal, and only 2 (3·57 per cent.), namely, cases of pharyngeal palsy, could be considered dangerous.

Adults, therefore, who as a rule are affected most by serum phenomena and least by paralysis, will derive some consolation for their sufferings from the well-grounded assurance that the prospect of subsequent disablement is small, and that recovery will be rapid when once the rash has disappeared.

A REVIEW OF RECENT INVESTIGATIONS ON THE PHYSIOLOGY AND PATHOLOGY OF SECRETORY TISSUES.

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(*Concluded.*)

VI. *The Thyroid Gland.*—Probably no branch of medicine suffers at the present moment from greater neglect than the one which deals with certain disorders, which are very probably dependent upon autochthonous agencies. These factors in disease may be of two kinds, they may be agencies resulting as sequels to the introduction of such poisonous agents as alcohol, the virus of syphilis or lead, or they may be products of disturbed action of various specialised tissues such as the thyroid or other glands. So far as the thyroid, or parathyroids, or other glands, are concerned, the want is not so much in the direction of the study of the effect produced by their suppression, for that, experimentally, is comparatively easy, but rather are we at a loss for sufficient knowledge of the effects of hyperfunction of these organs. Still more defective is our knowledge of the harmful effects produced, when the internal secretion of an organ is not merely excessive but defective, in the sense that abnormal qualitative internal secretion is taking place.

The group of symptoms known as tetany has been ascribed to a variety of causes, but of all these none appear to be so closely associated with this curious group of symptoms than disturbances of the thyroid and parathyroid apparatus. The experimental or operative suppression of these two tissues is capable of producing severe typical tetany, and the same group of symptoms has been frequently noted as a prominent feature in the closing scenes of cases of exophthalmic goitre. Jacobi (*Wien. med. Wochenschr.*, 1904, s. 768), after describing three cases of simple goitre occurring in one family—the mother, a son æt. 16 years, and a daughter æt. 15 years — refers to a case of exophthalmic goitre occurring in a woman. She

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became pregnant, and at about four and a half months developed tetany, which, however, disappeared when the confinement took place. Ferenezi has collected a large number of cases of women affected with simple goître, who also during pregnancy developed tetany. Facts such a these have led gynæcologists to recommend the treatment of tetany, occurring in pregnancy, by means of thyroid extract, and apparently with some success, though no pathological change beyond hypertrophy was noticeable in the gland.

So curious are the terminal symptoms of exophthalmic goître, and so suddenly are they frequently developed, that Cleveland's contribution to the study of the symptoms immediately preceding death deserves the closest attention (*Guy's Hospital Reports*, 1902, Vol. 55, p. 191). Cleveland has made an analysis of the terminal symptoms in 11 cases of uncomplicated exophthalmic goître. It is quite common for the ordinary well-recognised symptoms to grow worse till death closes the scene. Amongst more unusual symptoms are the progressive intensification of psychical deterioration ; delirium, for example, may be so extreme as to require physical restraint. The temperature may be raised, the pulse become still more frequent, and dyspnœa extremely hurried, although post-mortem, no inflammatory lesion can be discovered in the lungs. Excessive sweating may occur as well as dermatitis, icterus, and, in one case, convulsions. The more numerous these remarkable symptoms, the worse is the prognosis. Cleveland was disappointed in the post-mortem findings, for there was nothing much in common in the pathological anatomy of the 11 cases.

Bar (*Epitome, Brit. Med. Journ.*, 1904, Vol. I., No. 332) reports a case of Graves' disease in which glycosuria occurred in association with enlargement of the thyroid gland. His patient was a woman pregnant six and a half months. There was no exophthalmos, the urine contained 3·66 grammes of sugar per litre, and a trace of albumen. A dietary consisting largely of milk was followed by the disappearance of the glycosuria, but on its discontinuance glycosuria returned ; a fortnight after delivery sugar disappeared from the urine, and the swelling of the neck was also reduced.

According to Vassalle and Generali, the parathyroids have a function entirely different to that of the thyroids. Absence

of the latter causes the various morphological characters that are diagnostic of myxœdema, owing to the absence of the thyroidal secretion which has important effects on the metabolic changes throughout the body. The parathyroids, on the other hand, produce a secretion which is antitoxic to the products of the thyroid activity, and should the parathyroids be suppressed, then the substances produced by the reaction of the body to thyroidal influence, cause tetany and other nervous manifestations. Doyen and Jouty (*Compt. rend. de l'Acad. des Sc.*, 1904, No. 1, p. 53) find that the removal of the parathyroids in birds produces the same result as their ablation in dogs and rabbits, viz., lameness, contractures, fibrillary twitchings, diarrhœa, and vomiting; the gait becomes atactic, and finally there is complete inability to walk. These symptoms begin 6 to 8 hours after the operation, and death occurs in 24 to 36 hours. In accordance with Brissaud's observation that in post-operative myxœdema in man, resulting from the removal of thyroidal and parathyroidal tissue, Doyen and Jouty find that both morphological and psychical, as well as other nervous phenomena, occur in birds, when the same two tissues are extirpated, sufficient thyroidal juice presumably being present and active in the tissues, and so producing toxic effects, which failed to be neutralised by the parathyroidal secretion available.

That Graves' disease is not due to the mere escape into the tissues of an excessive thyroidal secretion is shown by Donath (*Zeitschr. f. klin. Med.*, 1903, Bd. 38, Hft. 1, 2, and 3; and Bd. 48, s. 65), for he finds that intravenous injection of a watery extract of thyroid gland causes a fall of blood pressure, whereas observations on the blood pressure of seventeen cases of exophthalmic goître, using Von Basch's sphygmomanometer, Hill and Barnard's sphygmodynamometer or Gärtner's tonometer showed a fall of blood pressure in but a small number of cases, more often it was normal or raised. Spiethoff's observations (*Centralbl. f. Innere Med.*, 1902, No. 34, s. 849) on the blood pressure in the same disease agree in the main with those of Donath. Spiethoff used v. Recklinghausen's modification of the Riva-Rocci instrument. No definite constant changes of blood pressure were found: in seven cases a rise or fall was present; in less severe cases there was no essential difference from normal individuals. Possibly the

alterations in severe cases are dependent, on the one hand, on the weakening of the heart, on the other, on vaso-motor disturbances.

Epilepsy is a well-known symptom in exophthalmic goitre, but chorea is rare. Rudinger (*Gesellsch. f. Inn. Med. Wien,* Jan. 15, 1903) demonstrated a case of acute Graves' disease with marked pulsation of the thyroid, exophthalmos, tachycardia (120-140 beats to the minute), frequent fine tremor and moistness of the skin ; Von Graefe and Mœbius' phenomena were also present. In addition there were symptoms of chorea. Sutherland (*Brain,* Summer No. 1903, Part CII., p. 210) also reports a case of the occurrence of chorea in exophthalmic goitre.

Usually the treatment of myxœdema is not associated with the development of untoward symptoms unless the thyroid extract is given in excessive doses. Aalbertsberg (*Nederl. Tijdschr. voor Genesk.* 1902, II., p. 1125), however, reports an unusual phenomenon. A case of myxœdema was being treated with pulverised thyroid gland, and, shortly after the treatment was instituted, partial blindness with double optic neuritis developed, finally atrophy occurred in both eyes, though the right eye subsequently recovered. It is difficult to understand why this should have been anything more than a coincidence.

The symptomatology of both myxœdema and exophthalmic goitre is now comparatively sharply defined, but it is becoming more and more recognised that there are certain cases which do not conform strictly to either clinical picture, characteristics of both diseases being shown. For this group of anomalous cases, French physicians have introduced the term "Dyshyroidism." v. Schrötter, in a contribution on abnormal types of Graves' disease (*Zeitschr. f. klin. Med.,* 1903, Bd. 48, s. 1), describes a case in which on one occasion there was marked pigmentation, later on a remarkable swelling occurred in the legs compared with the arms: the swelling was like that of myxœdema, as pressure with the finger produced no pitting. A portion of the skin and subjacent tissue was removed for microscopical examination, and nothing was found but a sort of lipomatosis. Under observation, occasional shrinkage of this swollen skin was noticed, and on one occasion the shrinkage of the left thigh amounted to 4 c.m. in fourteen days,

on another occasion 7 c.m. in two months. v. Schrötter compares these local reductions of tissue with the "crises d'amaigrissement" described by Huchard as occurring in certain cases of Graves' disease, the patient in these attacks, which may last for several weeks and yet be recovered from, losing a great deal of flesh. v. Schrötter found thyroid treatment of distinct value in the treatment of his peculiar case as the swelling was reduced, the thyroid enlargement lessened, and the tachycardia became less marked. v. Schrötter adopts the term "Dysthyroidism" for these anomalous cases, and attributes them to a disturbed chemical action of the thyroid secretion. The term may be useful clinically, but until the nature of the chemical deterioration is supported by proof, the introduction of such a term can hardly be commended.

Some cases of this so-called dysthyroidism, which have failed to respond to thyroid and other medicinal treatment, have been subjected to surgical extirpation of the gland, and the ordinary treatment instituted as for cases of spontaneous myxœdema. This practice requires careful consideration, in view of the fact that certain cases of myxœdema ultimately fail to react favourably to thyroid feeding. Another fear is that grave blood disturbances may develop, for they are known to follow the extirpation of the thyroid. Mezincescu (*Arch. de méd. exp.*, 1902, T. 14, p. 266) has shown that the extirpation of the gland in dogs leads to a reduction of red corpuscles, and to an increase in the leucocytes. Another important aspect of this question was revealed by Lorenz at the German Surgical Congress (*Lancet*, 1904, Vol. I., p. 1308). He found that the removal of the thyroid in moderately young animals is followed by sterility, which is little influenced by the subsequent use of thyroid or thyroidin. Lorenz referred to the case of a male cretin, æt. 28 years, in whom the sexual function was absent, but which returned on the administration of thyroid substance ; this man ultimately married, but there was no issue.

The changes occurring in the thyroid gland in various disorders affecting the individual are little known. It is stated that thyroid involvement leads to a disturbance of the kidneys and the pituitary body ; and Roger and Garnier have described numerous microscopical changes in the thyroid resulting from

infectious diseases; they find that there is an increase of interstitial tissue, that the lymphatic vessels are dilated and filled with colloid, and that the thyroid follicles are shrunken and their contents altered; proliferation of the secreting epithelium occurs, and arteritis and phlebitis are well marked. Kashiwamura (*Virchow's Archiv*, No. 166, s. 373) has examined the thyroid gland in fifty-five cases; in thirty-eight of these death had occurred from infectious diseases, and the remainder died from other causes; Kashiwamura was unable to confirm the observations made by Roger and Garnier.

After the use of preparations containing iodine, symptoms have occasionally arisen which have led to the suspicion that the thyroid gland had been excited to excessive function, and the well-known observation that the thyroid secretion contains much iodine lends support to this possibility. Sellei (*Arch. f. Dermatol. u. Syph.*, 1902, Bd. 62, s. 115) describes the local changes occurring in the thyroid gland after the use of two tablespoonfuls of a 5 per cent. solution of potassium iodide given to a young woman suffering from syphilis. On clinical grounds he describes the change as an inflammatory one. Besides nasal catarrh, fever was observed as well as swelling and tenderness of the thyroid gland. Ten days after the cessation of the use of the drug the swelling disappeared.

The number and variety of the methods adopted for the treatment of Graves' disease bear considerable evidence of their inadequacy, but observers of large experience report favourably of the electrical treatment. Crisafulli (*Il Morgagni*, 1903, No. 45, Fascic. 1, p. 446) has extended its use to the treatment of what is described as a case of simple goître, though the occurrence of epilepsy in the same patient, simultaneously with the development of the goître, points to the possibility of the case being one of masked Graves' disease; two years' use of potassium bromide had produced no favourable results, but by following the plan of placing a positive electrode wrapped in wool, which was soaked in iodine, over the gland, the negative pole being placed on some indifferent region, shrinkage of the gland took place as well as complete cessation of the fits.

Wertheimer (*Fortschr. der Med.*, 1904, No. 24, s. 819) adopts the more conservative line of treatment of Graves' disease, and recommends mental and bodily rest, milk diet, open air, and

the use of sodium bromide ; helpful adjuncts are the use of arsenical preparations and tepid and cold bathing.

Saline infusion has been found of service for the relief of such obviously toxic conditions as uræmia, eclampsia, and diabetic coma ; and Voss (*Deutsch.med.Wochenschr.*, 1903,No. 33, s. 590) finds that the serious toxic manifestations of Graves' disease yield to the infusion of 450 c.cm. of physiological salt solution.

Dubar (*Le Progrès méd.*, 1904, No. 4, p. 49) describes two cases of simple goître which were treated by the intraglandular injection of iodised oil. The injections were given at intervals of eight days ; beyond local hardening no unpleasant results occurred, and improvement was observed. Woelfler (*Präger med. Wochenschr.*, 1903, XVIII. s. 49 u. 62) obtained similar results by the intraglandular injection of iodine dissolved in ether and olive oil, but notes that the procedure was not without danger.

It is a considerable relief to turn from methods of treatment of disorders of the thyroid, based upon principles which have little experimental support, to those which are in harmony with the more modern discoveries of cytolysis. G. R. Murray (*Lancet*, 1904, August 24, p. 583) reports that he has failed to secure the good results which have been reported from the use of the serum of thyroidectomised goats in cases of Graves disease. Following up the methods suggested by Mankowsky, Goutscharukov and Portis, Murray has endeavoured to produce an antitoxic serum for use in exophthalmic goître, a serum which will lead to solvent effects upon the thyroid gland and yet not produce harmful effects in other organs. Rabbits were treated with five minims each of thyroid extract three times a week ; subsequently these animals were bled and doses of 5–7 minims of their serum were administered to patients suffering from Graves' disease. So far Murray has not been able to secure definite results, but thinks that, if larger animals and larger doses of thyroid extract are used, a serum may be obtained of use in acute cases by injection and in chronic ones by feeding.

Tomaselli (*Gaz. degli ospedali e della Clin.*, 1902, No. 42), following up the treatment of Graves' disease recommended by certain French writers, viz., excision of the cervical sympathetic, says that such operation should only be performed in

severe cases with ulceration of the cornea and other complica-
tions threatening life, when other treatment has been found of
no avail ; in the case reported by Tomaselli, the upper and
middle cervical ganglia were removed and favourable results
were obtained.

It has been thought that local anæsthesia would prove of
great service in operations upon the enlarged thyroid gland in
which general anæsthesia would otherwise be dangerous by
reason of the pressure upon the trachea by the thyroid or by
an enlarged thymus. In some cases death has resulted in quite
simple operations upon other parts of the body, a general
anæsthetic being used, and the presence of an enlarged thymus
has led to the belief that in some way it is connected with the
fatal issue (thymus-death). It would appear from an obser-
vation made by Nettel (*Arch. f. clin. Chir.*, Bd. 73, Heft 3,
s. 637) that death in such cases does not depend upon the toxic
effects of the general anæsthetic used, but more probably upon
the mere shock of operative interference, a grave form of central
nervous depression being produced. Nettel describes a case of
death following immediately upon an operation in the thyroid
gland, local anæsthesia being employed.

VII. *The Suprarenal Gland.*—Neurasthenia is a malady
which, so far, investigation has shown is unassociated with any
particular morbid picture, but the muscular weakness, the loss
of appetite, general feebleness, and fall of arterial tension, which
are so frequently met with in these cases, have led Merklen to
attribute neurasthenia to a want of functional activity on the
part of the suprarenal bodies. Bernard and Heitz (*Fortschr.
der Med.*, 1904, No. 17, s. 720) describe a case in which
similar symptoms, followed however by death, were found to
be associated with no changes other than those which were
found in the suprarenal glands ; the medullary substance was
markedly altered, the cortical cell-elements were atrophied, and
there was a marked ectasis of the capillary vessels. The patient
was a young man, who had been previously quite well, was
seized with rapidly developing weakness of the muscles ; in six
months he was quite powerless, suffering from severe abdominal
pain, vomiting, loss of appetite and pallor ; death occurred
quite suddenly.

A most interesting contribution to the pathology of

Addison's disease has been made by Wiesel (*Gesellsch. f. Innere Med. Wien*, 1903, June 4). The medullary portion of the suprarenals is in direct developmental relationship with the sympathetic nervous system. In Addison's disease a tuberculous process, in a large proportion of cases, involves the medullary portion of the suprarenals, but there are cases in which many of the symptoms of Addison's disease are present, and yet this morbid picture does not occur, indeed the suprarenals may appear to be unaffected. So far experiment has entirely failed to produce the complete picture of Addison's disease. Wiesel has developed a new theory to explain the occurrence of Addison's disease. He finds that the elements present in the sympathetic nervous system are three in number —ganglion cells, nerve fibres, and chromophile cells, *i.e.*, cells which give a brown coloration on the application of chromic acid. The chromophilic cells occur in small clumps in all parts of the sympathetic system, and they are identical with those of the medullary part of the suprarenal bodies ; probably these cells produce a substance which acts on involuntary muscle. Wiesel examined microscopically the tissues of five cases of clinically manifest Addison's disease, and found that the chromophilic cells had completely disappeared, whilst the adrenals, with the exception of the medullary part, and accessory adrenals appeared to be intact. He therefore concludes that Addison's disease is a primary disease of the chromophilic system of cells, and that secondarily on the one hand the rest of the sympathetic system is attacked, and on the other the cortex of the adrenals. It 'is possible by this theory to explain some cases of Addison's disease in which the medullary substance as well as the cortex of the suprarenal bodies appear normal and possessed of chromophilic cells. Though present, these remaining cells are insufficient for the needs of the body, in the absence of the chromophilic cells which normally occur in the rest of the sympathetic system ; and it is thus further possible to harmonise the observation of those cases of Addison's disease in which the solar plexus and not the suprarenals are found at fault. Aschoff (*Epitome, Brit. Med. Journ.*, 1903, Vol. I., No. 358) finds chromophilic cells in the paroophoron and paradidymis similar to those occurring in aberrant masses of suprarenal tissue known as " accessory suprarenals."

The chromophilic reaction above mentioned is found to be due to granules present within the protoplasm ; the colour changes, produced by chromic acid, are also described by the French as a "phæochrome" reaction. Mulon (*Compt. rend. de la Soc. de Biol.*, 1904, T. LVI., pp. 113 et. 116) has found the phæochromic granules not only in the suprarenals of fish, but in the carotid glands of mammals. It is interesting to learn that not only do these granules give the chromophile reaction (Stilling) or "chromaffine" (Kohn) a reddish ochre coloration, but that adrenalin solution will do the same, and that both materials give the same reaction with perchloride of iron (green coloration) and with osmium tetroxide (red to black). The osmic acid at first produces a rose-red colour which is also noticed when osmic acid is allowed to act on adrenalin crystals ; later a brown or black reaction occurs as a result of the separation of reduced osmium.

Soulié (*Journal. de l'anatomie et de la physiol.*, 1903, No. 3, p. 197 ; 4, p. 390 ; 5, p. 492 ; 6, p. 635) finds that the mesoblastic cortical part of the suprarenal glands is present in the human embryo when it has reached a length of 6 mm. ; the sympathetic system is visible in the eighth month, and parts begin to penetrate the capsule in the embryo of 19 mm. length ; the chromophilic reaction can be obtained in the fœtus of the fourth month.

Reimann describes (*Präger med. Wochenschr.*, 1902, No. 25, s. 297) a remarkable case of melanotic carcinoma of the suprarenals in an infant three months old. During life the skin was yellowish-brown, but not so intense as in Addison's disease. The writer was unable to find a record of any similar case. It is possible that the neoplasm originated in the chromophilic cells.

The fact that the extract of suprarenal glands is capable of increasing blood pressure has naturally raised the question whether hyperpiesis or high arterial tension might not be due to an excessive amount of the internal secretion of the suprarenal being present in the circulation. In opposition to this view Aubertin and Ambard (*Fortschr. der Med.*, 1904, No. 13) state that they have found that contracted kidney, enhanced arterial tension and arterio-sclerosis go hand in hand with hyperplasia of the cortical substance of the adrenals. Their observations were carried out on eight individuals in whom nephritis and raised blood pressure were observed. Exami-

nation was made also of nineteen other cases not suffering from raised arterial tension. In three of the eight cases large adenomata were found, and in the remaining five the cortical cells showed hyperplasia, and the medullary substance was atrophic. In only one of the nineteen other cases was any change found in the suprarenal body. Aubertin and Ambard share in the generally accepted view that the medullary substance of the suprarenal gland alone contains the active principle adrenalin, and that this principle is a potent factor in maintaining arterial tension, and that the cortex of the supra-renals has no influence in this direction. As a result of their observations, they consider that arterio-sclerosis is not the result of hyperplasia of the cortical substance, but that both phenomena constitute a reaction to some poison which, as a result of renal disease, is not properly excreted. This poison could hardly be adrenalin as the medullary substance of the adrenals was found atrophied.

There have, however, of late been described some rather striking observations which tend to confirm the view that the suprarenal secretion exerts pronounced pathological effects upon the blood vessels. The causation of atheroma of the blood vessels remains a pathological puzzle, but Erb (junior) (*Congress f. Inn. Med., Leipzig*, April, 1904; *Wiener med. Presse*, 1904, No. 18, s. 885), after injecting into the veins of the ears of rabbits three drops daily of a 1 in 1000 solution of adrenalin, found varying degrees of arterial disease and even marked atheroma of the aorta. Casimir v. Rzentkowski (*Berlin. klin. Wochenschr.*, 1904, No. 31, s. 830) is able to confirm these observations and also similar ones made by Josué. v. Rzent-kowski points out that after repeated injections the heart hypertrophies, and numerous calcareous areas appear in the wall of the aorta, and there is noticeable a tendency even towards the development of aneurysms. Cirrhosis of the liver was also observed—an interesting observation because of the very varied opinions held as to the actual cause of cirrhosis of the liver, whether it is due to toxic agents arriving by the redicles of the portal vein, or whether, as in many cases of granular kidney associated with disease of the renal vessels, cirrhosis of the liver is dependent upon vascular disease affecting the branches of the hepatic artery. v. Rzentkowski is not quite

sure, however, that the calcareous areas produced by adrenalin injection are really of the same nature as atheroma, for he finds that the calcareous plates developed as a result of his experiments are succeeded, and not preceded, by a round-celled infiltration. Manicatide and Jianu (*Spitalul*, 1904, *No.* 14) describe a case of general atheroma with hypertrophy of the suprarenals and hæmorrhage into one lobe of the cerebellum, occurring in a patient 47 years of age, an observation which would give much support to the views already referred to, in which it is thought that arterial disease follows disorder of the suprarenals, had it not been that there was a history of syphilis in this case, and so far there are no observations pointing to any association between syphilitic infection and increased function of the suprarenal.

Hæmorrhage into the suprarenals appears to be particularly likely to cause death. Dudgeon (*American Jour. of the Med. Sc.*, 1904, p. 134) found that death in three out of the four cases described in children was probably directly associated with the suprarenal hæmorrhage.

Thickening of the intima of arteries and veins, with or without thrombosis, is one of the most constant discoveries in cases of Raynaud's disease, which, by reason of their severity requiring operation, lend themselves to histological enquiry. In view of the above alleged association between vascular disease and suprarenal activity, Harbison's observation of the association of sclerodermia, Raynaud's disease, and Addison's disease in the same patient is of great interest (*Brit. Med. Journ.*, 1904, p. 126).

It is of importance to know why injection of suprarenal extract produces glycosuria. Crofton (*Pflüger's Arch. f. d. ges. Physiol.*, 1902, Bd. 90, s. 285) contributes observations which throw considerable light on the difficulty. By means of ammonium sulphate a substance can be obtained from watery extract of suprarenal glands, which, under aseptic conditions, can digest starch, and produce sugars such as maltose or glucose, or both. Alcohol appears to destroy the glucose-forming ferment. Crofton believes that the suprarenals act as filterers, which remove this diastatic ferment from the blood and lymph. The observations of Lydia Félicine (*Arch. f. mikr. Anat.*, 1904, Bd. LXIII., s. 283) support this view of filtration by

cortical activity, for, according to this observer, the cortex of the suprarenal is receptory and not secretory. Failure in the performance of this function leads to too abundant a conversion of various precursors of sugar into glucose, and hence the explanation of certain cases of suprarenal diabetes. Lœper and Cruzon (*Arch. de méd. expériment,* 1904, T. XVI., p. 83) show that the injection of adrenalin is capable of reducing the internal secretion of the pancreas, and the lipolytic, amylolytic, and glycolytic power of the blood. Their work, therefore, confirms Herter's view that adrenalin produces glycosuria by acting through the pancreas. Paton (*Lancet,* 1904, Vol. I., p. 654) makes use of the observations of v. Mering and Minkowski that ablation of the pancreas in birds was not followed by the development of glycosuria ; in birds, therefore, the pancreas does not play the direct part it does in dogs in promoting the metabolism of sugar. Injection of adrenalin into birds is, however, capable of producing glycosuria, so that Paton considers that adrenalin glyosuria is due rather to a disturbance of the synthetic process occurring in the liver.

Pepere (*Arch. de méd. expériment,* 1902, T. XIV., p. 765) describes a unique case of primary malignant disease of the liver arising from aberrant masses of suprarenal tissue which had existed embedded in the liver substance ; the medullary cells of the suprarenal are the cells more particularly repeated in the growth ; metastases occurred in the diaphragm, lungs, and inguinal glands.

Parodi (*Lo Sperimentale,* 1904, Feb., p. 47) describes his attempts to transplant fœtal suprarenal tissue in adult animals. As compared with the grafts of adult suprarenals, Parodi finds that fœtal grafts have a greater power of attachment to surrounding tissues and greater power of cell proliferation, but they undergo involution more rapidly, and offer less resistance to the connective tissue which enwraps and progressively invades them. It is impossible both in fœtal and adult grafts to secure a growth of the cells constituting the medulla.

So important are the toxic effects produced by adrenalin that it becomes necessary to establish a toxicological test which may be readily applied. Meltzer and Meltzer-Auer (*Centralbl. f. Physiol.,* 1904, XVIII., 11, s. 317) point out that adrenalin

after injection under the skin, or after instillation into the eye, of a mammal, produces dilatation of the pupil, only if the upper cervical ganglion of the corresponding side has been removed some 24–48 hours previously. In the case of frogs the same method of introduction of adrenalin produces a rapid dilatation of the pupil without any operative interference with the sympathetic.

The effects of adrenalin upon the musculature of blood-vessel walls is quite transitory, and it has been maintained that this is due to oxidation by the tissues. Weiss and Harris (*Arch. f. d. ges. Physiol.*, 1904, CIII., 9 u. 10, s. 510) find, however, that, after the injection of adrenalin blood, pressure rises and is kept up for a time only, although the adrenalin injected is not completely destroyed. A series of injections of similar amounts of adrenalin was carried out, and, confirmatory of the above observations, it was found that the effects of later injections were much less than those of earlier ones, and the last ones were found to be quite without results. The authors of this paper, therefore, conclude that the transitory effects of the adrenalin are attributable to fatigue of the muscular coat of the vessels. Embden and Fürth, studying the same problem, came to the conclusion that, although the blood, alone of all the tissues, may to a certain extent oxidise the active principle, the loss of effect is certainly not due to the filter action of the kidney. They attribute the evanescent effects of adrenalin to its escape from the blood vessels which, after the initial contraction, become much dilated. Läwen (*Arch. f. Pharmak. u. Toxik.*, 1904, LI., s. 415) believes that the muscular coat of the vessels is capable of completely destroying adrenalin, and that the addition of eucain or tropocain to adrenalin solution tends to produce the complete destruction of the adrenalin.

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RECENT ADVANCES IN DERMATOLOGY.

I.—TUBERCULOSIS CUTIS.

II.—THE X-RAY TREATMENT OF RINGWORM OF THE SCALP.

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I.—TUBERCULOSIS CUTIS ; ITS VARIETIES AND CONGENERS.

On September 24th, 1904, the world was the poorer by the death of one of the most scientific of physicians and modest of men, who, in spite of an increasing physical infirmity sufficient to have rendered most men incapable of work, laboured on with an indefatigable energy, and has left as a heritage to humanity a method of curing, with brilliant results, one of the most persistent and disfiguring affections of the skin. By means of the application of the actinic rays of light Niels Finsen showed that the diseased tissue in lupus vulgaris could be destroyed and be replaced by a scar which was less noticeable and more lasting than that which resulted from any previous method of treatment. But not only has a great advance been made recently in the treatment of tuberculosis cutis, but the record of much valuable research has been published on the various types of clinical lesions for which the tubercle bacillus and its toxins are responsible. A brief reference to some of the more important contributions on this subject may prove of interest.

As our knowledge of the skin manifestations of tuberculosis becomes more exact, we have come to recognise the fact that tuberculosis cutis is almost as multiform an affection as cutaneous syphilis. Tuberculosis cutis in all its forms is the result of the reaction of the skin to the tubercle bacillus and its toxins in situ. For a skin lesion to be established as tuberculous it is necessary that tubercle bacilli should be found in it, that the inoculation of diseased tissue in a guinea-pig or some other susceptible animal should give

positive results, and that a general and local reaction should
follow the injection of tuberculin. The obtaining of a histo-
logical architecture, characteristic of tuberculosis in microscopical
examination, is a valuable aid to diagnosis, but the absence
of it must not be relied on as placing tuberculosis out of court,
for in some instances the microscopical appearances of tuber-
culous skin are even more indefinite than the clinical signs.
The following clinical types have satisfied these tests sufficiently
to be regarded as skin manifestations of tuberculosis, namely,
lupus vulgaris, scrofulodermia, and miliary tuberculosis of the
skin. Several other affections, such as erythema induratum
of Bazin and Acne scrofulosorum, for reasons to be referred
to later, are still regarded as doubtful by certain observers,
while they are accepted as being tuberculous by others. There
is also a third group of cutaneous lesions to which the French
dermatologists have given the name of toxi-tuberculides,
which they believe to be connected with tuberculosis, and to
be due to the tuberculous toxin, and not to the action of the
bacillus in situ.

Recent research on this subject has been chiefly occupied
with the problem of the mode of invasion of the skin by
the tubercle bacillus, the establishment of doubtful lesions as
tuberculous, and the consideration of the debatable group of
the tuberculides.

In lupus vulgaris tubercle bacilli have been found repeatedly,
but usually with difficulty, as they are sparsely distributed in
the affected skin. Professor Doutrelepont, of Bonn, succeeded
in demonstrating the bacillus in 24 out of 25 cases, but this
is an unusually high average. As a rule a large number of
sections of lupus vulgaris may be carefully examined without
the bacillus being found, and it is only after the exercise of
great patience, and the examination of many specimens, that
the search may be rewarded and the bacillus detected.
With regard to its mode of invasion, the bacillus may gain
entrance into the skin either from without or from within. In
a large number of cases it becomes deposited on the surface,
and enters most probably through an imperceptible abrasion
of the skin. It has been shown that in the majority of cases of
lupus vulgaris the patients either suffer from tuberculosis in some
other organ, and are liable to infect the skin secondarily, or

they live in an unhealthy environment, and are not infrequently the offspring of tuberculous parents.

Shiele, in a critical summary of 50 case of lupus vulgaris (*Archiv f. Derm. u. Syph.*, 1903, LXVII., p. 337), found that in 10 cases the lung was involved, in 2 the joints were affected, in 1 tabes mesenterica was present, and in 22 there were enlarged glands. These observations correspond with those of several other writers. For example, Renouard found tuberculosis of other organs in 50 per cent. of his cases of lupus, Haslund in 60 per cent., and Block in 75 per cent. It is, as a rule, difficult to get a clear history of local infection with tubercle bacilli, but a sufficient number of definite instances have been recorded to show how readily it may occur. For instance, cases have been reported where a patch of lupus has developed on the hand as a result of a cut from a broken vessel containing tuberculous sputum, or where it has resulted from a scratch of a knife in doing a post-mortem examination in a case of tuberculosis, or in a butcher in cutting up an infected animal. Lupus has also been known to have developed on vaccination scars from an accidental inoculation of the bacillus before the eruption of vaccinia has healed, and there are a number of observations on record where circumcision wounds have become infected and transformed into tuberculous ulcers. Instances of such inoculation need not be multiplied further. There is another factor also which increases the liability of infection, namely, any local cause such as a boil or lesion of impetigo, which diminishes the resistance of the skin at the time, and furnishes a suitable soil for the growth of the bacillus. Another common mode of infection of the skin with tuberculosis is by a spreading of the disease from an infected mucous membrane such as the nasal mucosa, and in a considerable proportion of cases the mucous membrane of the nose is the first site to be involved.

But not only may the tubercle bacillus invade the skin from without, it may reach it from within either by the blood-stream or through the lymphatics. For example, cases occur in which a number of patches of lupus vulgaris develop simultaneously, and more or less suddenly in a child, almost immediately after an attack of measles. It is believed that the skin-lesions in these cases are the result of the breaking down of a tuberculous

bronchial gland and a dissemination of the bacilli in the blood from that source. These bacilli, on reaching the capillaries of the skin, are arrested in their course and there give rise to the patches of lupus. H. G. Adamson has collected and summarised a number of such cases in an interesting paper entitled " Multiple Lupus Vulgaris consecutive to Measles." (*Brit. Journ. of Derm.*, 1904, XVI., p. 366.) From a consideration of these cases he found that there might be as many patches as 50 or more, and that the lesions developed simultaneously during or soon after the measles eruption, and as a rule persisted, though in some of them there was a tendency for them to disappear spontaneously. He remarked that "the suggestion that the toxin of measles softened some pre-existing tuberculous focus, and gives rise to an embolic shower, seems the most feasible explanation." Occasional cases of this type have also been reported after scarlet fever. Philippson recorded two such cases in 1892. In nearly all these cases the patches of lupus on the trunk and limbs show a marked tendency to be verrucose in character, and they frequently present a purplish rather than a brownish tinge. A case of this type has been described by Wolters (*Archiv f. Derm u. Syph.*, 1904, LXXII., p. 83), as " Lupus of hæmatogenous origin."

In a case of multiple lupus following measles which the writer recently showed at a meeting of the Dermatological Society of London (*Brit. Journ. of Derm.*, 1905, XVII., p. 59), besides the verrucose patches of lupus on the limbs, there were several necrosing indolent lesions situated on the legs which are known by the old-fashioned title of " *scrofulous gummata.*" These lesions, which are closely related to lupus patches ot hæmatogenous origin, occur most commonly on the limbs in weakly, tuberculous children. They vary in size from a split-pea to a hazel-nut or larger. At first they are more readily felt than seen, as they begin as deep-seated nodules in the skin. Their evolution is very slow. As they increase in size the skin over them gradually assumes a reddish-purple tinge, they become soft and fluctuate, necrosis takes place, and the lesion becomes replaced by a depressed and permanent scar During their course, which may last several months, they are practically painless. These lesions have been established as tuberculous. In a case reported in 1901, in collaboration with

Ormsby, the writer found tubercle bacilli in a giant-cell in a scrofulous gumma excised from a boy aged 17 months (*Brit. Journ. of Derm.*, 1901, XIII., p. 267). The sections showed evidence also that in these cases the deep-seated vessels and chiefly the veins of the subcutaneous tissue were primarily involved. These became greatly thickened from endophlebitis and around them a dense infiltration of cells became deposited which gave rise to the deep-seated nodules. Unfortunately, tubercle bacilli have not, so far as the writer is aware, been demonstrated in the vessels.

Besides the scrofulous gummata there is another form of *scrofulodermia* which is familiar, namely, the inflamed œdematous infiltrated patches which occur as the result of a secondary infiltration of the skin from some deep-seated focus of tuberculosis such as a tuberculous gland or tuberculous bone disease. In this form of tuberculosis cutis the bacilli reach the skin through the lymphatic channels and the spaces between the fibrous bundles of the corium.

In addition to the established varieties of tuberculosis cutis there are several types of cutaneous lesions which have been almost conclusively proved to be tuberculous, but regarding which there is still some doubt in the minds of certain observers as to their right to be placed in this group. One of the most common of these doubtfully tuberculous diseases is the condition named by Bazin, *Erythema induratum.* It is an insidious affection of the skin which occurs on the leg and especially the calf, and is met with almost exclusively in delicate girls and young women among the working classes, and often in those who give evidence of a scrofulous diathesis. It is characterised, like scrofulous gummata, with which it is closely allied, by deep-seated indurated nodules at first about the size of a split-pea, but which gradually increase in the course of a few weeks to that of a cherry or a walnut. The skin over them is purplish-red in tint. After a more or less prolonged existence they either slowly soften and become absorbed, or undergo necrosis, form an indolent ulcer, and leave a scar. The histological architecture of many of the cases so closely simulates that of scrofulous gummata as to suggest that they are variants of the same pathological process. Tubercle bacilli have not been demonstrated in the lesions, yet MM. Thibierge

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and Ravaut have succeeded in producing general tuberculosis by inoculating a lower animal with a piece of tissue excised from a lesion. It is believed, however, that there are certain cases with similar clinical features which result from a necrotic process dependent on a disorder of circulation apart from tuberculosis.

There is another somewhat similar affection of the skin which belongs to this class, and is known as *Acne scrofulosorum*, since it was believed to be a form of acne, which occurred in scrofulous individuals, and was considered by several observers to be produced by the toxins of the tubercle bacillus, and to belong to the category of the tuberculides. It occurs in strumous individuals on the trunk and extremities, and is characterised by sluggish deep-seated lesions, which evolve in the same manner as those of erythema induratum, and leave a scar. The title of this disease is an unfortunate one, as it is not a form of acne, and is not necessarily follicular ; but although tubercle bacilli have not been demonstrated as yet in the lesions, and inoculation experiments have been negative, from its clinical characters, its association with other tuberculous manifestations and its histology, there is considerable reason for expecting that its tuberculous nature will be established in the near future.

The next group to be considered, and one which has attracted an unusual amount of attention of late, is that of the so-called *tuberculides*. The term *toxi-tuberculide* was introduced by Hallopeau to signify certain types of eruption, which occurred as a rule in tuberculous subjects, and were believed ʻo be caused by tuberculous toxin, but in the lesions of which tubercle bacilli were absent, and inoculation experiments gave negative results.

A number of affections have been from time to time placed in this category, and lately the list has been considerably augmented by various French writers. It is an ill-defined and somewhat hypothetical group. The disease, which seems to have most right to be included in it, is the affection of the skin known as *lichen scrofulosorum*. It occurs in tuberculous subjects, and is characterised by the presence of groups of chronic inflammatory papules, about the size of millet-seeds, and red in colour or fading to the tint of the surrounding skin.

It has been conclusively demonstrated that not only does this eruption occur in tuberculous subjects, but that, in an individual with tuberculosis, the injection of tuberculin may cause the eruption to appear either in groups of lesions on the trunk or more commonly around a patch of lupus vulgaris or other tuberculous lesion of the skin, which has reacted locally to the tuberculin injection. Klingmüller, in a paper entitled a " Contribution on Tuberculosis of the Skin " (*Archiv f. Derm. u. Syph.*, 1904, LXXII., p. 167), draws attention to this fact, and it is a most important observation, and goes far to prove that lichen scrofulosorum is a chronic inflammatory process for which the tuberculin is responsible either by directly acting on the skin, or indirectly by stimulating the tubercle bacilli in the neighbourhood to secrete toxins, or by a combination of both. In the majority of cases the search for tubercle bacilli in the lesions and inoculations in lower animals have been negative, and the appearance of the tissues under the microscope does not even suggest tuberculosis, so that in the true sense of the term lichen scrofulosorum has a definite claim to be entitled a toxituberculide. Against this, however, several observers, such as Jacobi and Pelizzari, have recorded cases in which tubercle bacilli have been detected, and a histological architecture simulating tuberculosis has been noted. But this is not the experience of the majority of writers, and Klingmüller, in the paper already referred to, gives a record of an examination for tubercle bacilli of 700 microscopical specimens from lichen scrofulosorum with negative results, and the unsuccessful inoculation of 27 guinea-pigs with pieces of tissue removed from 9 patients.

In addition to lichen scrofulosorum, Nicolau (*Ann. de Derm. et de Syph.*, October 1903, p. 713) places in this group acnitis, follicilis, lupus erythematosus, lupus pernio, erythema induratum, and certain varieties of nodular lupus in multiple patches. Pautrier, in a paper entitled " On the Tubercular Nature of Angio-keratoma and on the Tuberculides" (*Archiv f. Derm. u. Syph.*, 1904, LXII., p. 145), and in his monograph " Les tuberculoses cutanées atipiques," includes the following affections in the group :—erythema induratum, lichen scrofulosorum, lupus erythematosus, acnitis, follicilis, angio-keratoma, pityriasis rubra of Hebra, and Eczema scrofulosorum of Boeck.

It would be out of place here to discuss these various affections, which the chapter on the tuberculides has been extended to include, but a reference to the vexed question of lupus erythematosus will not be inopportune. This disease, partly on account of its unfortunate name, and partly because it was believed at a time when comparatively little was known of the pathology of skin-affections, to be related to lupus vulgaris, has always tended to be associated with tuberculosis cutis. For some time, owing to the facts that its histological architecture was characteristic and different from that of any form of tuberculosis cutis, and that tubercle bacilli were not found in the tissues, and inoculation experiments were unsuccessful, the idea that it was a tuberculous affection was abandoned, and it was believed to be more closely related to erythema multiforme than to lupus vulgaris, and to be a peculiar type of scar-leaving affection due to some unknown toxin. Now, with the extension of the group of tuberculides by the French writers, and the inclusion in it of lupus erythematosus, both the discoid and the generalised type of the affection, the question has been raised again. But the evidence is too slight to establish it as definitely connected with tuberculosis, for in the large proportion of cases of lupus erythematosus no conclusive signs of tuberculosis have been detected in the patient. In a paper on this subject, Walther Pick (*Archv f. Derm. u. Syph.*, 1901, LVIII., p. 358) tabulates 43 cases of lupus erythematosus which occurred in Neisser's clinic at Breslau between 1882 and 1901, in which, in spite of the most searching examination, and of a careful enquiry into the previous history of the patients, only 18 of them gave positive evidence of tuberculosis of other organs. This experience corresponds with that of probably the majority of observers, and until it can be shown that the disease only occurs in tuberculous subjects, or can be produced by injections of tuberculin, it seems premature to class it as a toxi-tuberculide.

II.—THE X-RAY TREATMENT OF RINGWORM OF THE SCALP.

The treatment of tinea tonsurans by means of the X-rays was suggested as early as 1896 by Freund, of Vienna, and has been employed in a more or less half-hearted fashion by a number of observers since ; but, partly as a result of defective technique,

and partly from fear of causing a dermatitis and a permanent cicatricial alopecia, this method of treatment has not attracted the attention it deserved. It has recently been shown, however, that the treatment is not only rapid and reliable, but in the hands of a competent operator is comparatively safe. It is to Sabouraud, of Paris, that we are largely indebted for establishing it. The action of the X-rays on the scalp is simply that of a depilatory, which, if the dosage be not excessive, causes the hairs to fall out without destroying the hair-papillæ and preventing re-growth. The rays do not kill the ringworm fungus, for cultivation can be made by planting, on a suitable artificial medium, hairs which have fallen out through the action of the rays. In an article entitled "The Treatment of Tinea Tonsurans by the X-rays"[1] (*La Presse Méd.*, December 28, 1904), Sabouraud and Noiré describe in detail the technique they have been employing with such brilliant success at the ringworm school connected with the Hôpital St. Louis, Paris.

The X-rays are obtained from two static machines, one with 12 plates and the other with 10. These are placed in a separate room in glass cases, and insulating wires pass from them through the wall to the X-ray tubes in the operating room. Regulating X-ray tubes are employed, and the sparking gap is kept below 10 c.m. The tube is enclosed in a metal shield or case with an opening in it, which can be altered in size as required, by means of an iris diaphragm. Metal cylinders, varying in diameter, are attached at the opening, and these are of such a length that the anode of the tube shall be 15 c.m. from the scalp. The required dosage of the rays to cause a defluvium of the hair after a single exposure is estimated by a radiometer devised by Sabouraud and Noiré. This consists of a small wafer-like pastille of platino-barium-cyanide about the size of a threepenny-piece, which, when exposed to the rays, becomes altered in colour from a greenish yellow to a fawn tint. These observers have estimated that the dosage of X-rays, capable of producing a certain standard tint of fawn, with the pastille placed on a metal holder at a distance of 7·5 c.m. from the anode, is sufficient to cause the requisite defluvium. The time occupied in altering the colour of the

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[1] For a full abstract of this paper by W. S. Fox see *Brit. Journ. of Derm.*, 1905, XVII., p. 67.

pastille to the standard tint is estimated each morning, as it varies, not only according to the type of tube and the amount of current passing through it, but also with the state of the atmosphere, for when the air is humid a longer exposure is necessary than when it is dry. With the apparatus in use at Charing Cross Hospital the writer has estimated that with a sparking gap of about 3 inches and a current of half a milliampère passing through the regulating tube, as recorded by a D'Arsonval milliampère metre inserted between the coil and the tube, on a dry day, the time taken to produce the standard colour in Sabouraud and Noiré's radiometer is about 16 minutes. The procedure is as follows:—The hair is first cropped short either by scissors or with small clippers of the pattern employed for clipping horses. If there are only a few ringworm patches on the scalp, a sheet of lead with the requisite number of holes, each being about 1 c.m. larger all round than the corresponding ringworm patch, is adjusted on the scalp, and this allows the rays to act on the diseased areas and protects the remainder of the scalp. If there be only a single patch, a lead glass cylinder from the protecting shield of such a length that the scalp shall be distant 6 inches from the anode, is employed instead of the sheet of lead. On the other hand, if the disease be widely disseminated over the scalp, it may be advisable to cause a complete defluvium of the hair. This can be done by dividing up the scalp into four areas, namely, the crown, parietal regions, and the occiput, and exposing them seriatim, great care being taken to protect the parts not being exposed so as not to expose even the borders of the areas twice. The hairs begin to fall out about the 15th day after the exposure, and the defluvium is complete in about a week. This can take place without any marked inflammatory reaction occurring in the scalp save a transient erythema which frequently appears about a week after the exposure. If the hairs do not begin to fall out on the 15th day, as sometimes happens from an insufficient exposure, or an idiosyncrasy on the part of the patient, a week is allowed to elapse, and a second exposure is given on the 21st day, and if necessary, a third, after a like period has elapsed. The healthy hairs begin to grow in again about 6 weeks after the defluvium, and have completely re-grown in about 3 months.

As the rays do not kill the fungus, it is imperative to prevent the spread of the disease while waiting for the depilation. This is done by rubbing in an antiparisitic ointment, twice a day, and thoroughly washing the scalp daily. For this purpose an ointment containing ammoniated mercury, or oleate of copper (20 grains to the ounce), may be used. Sabouraud employs oil of cade for this purpose (oil of cade, 10 grammes, lanoline, 25 grammes), and after washing the scalp each morning, has the following lotion rubbed in (tincture of iodine, 10 grammes, alcohol, 60 per cent., 90 grammes). In hospital children, impetigo of the scalp is liable to occur, specially in those with impetiginous or eczematous lesions elsewhere, and in such cases an ointment, containing 10 grains of ammoniated mercury and 10 grains of precipitated sulphur to the ounce, acts well.

This method of treatment is still in its infancy, and the technique of it is yet far from being perfect, but it promises to supersede all previous methods in cases of widely disseminated ringworm of the scalp. Where only a few small isolated patches are present it is possible to successfully treat them in a comparatively short time by epilation, needling with croton oil, and other familiar active measures, but when there is much disease many months and sometimes years are taken to get rid of this intractable affection. By the X-rays a complete defluvium may be produced in a single sitting, and by the 21st day every diseased hair has fallen out and the child ceases to be infectious. The remainder of the treatment consists in keeping the scalp healthy and stimulating the re-growth of hair by tonic lotions. The operation is, of course, attended with a certain amount of risk like all X-ray work, but, if proper measures of protection be adopted, it can be done with the minimum of danger to the patient and the operator. For institutions where a large number of severe cases of ringworm are collected together, the method has proved of the utmost value. In the ringworm schools in Paris, where the children are resident and educated during the whole of the treatment, since the X-ray method was introduced, the cost of the treatment of a single case has been reduced from about 2,000 fr. to 260 fr., and the average time under treatment from 18 to $3\frac{1}{2}$ months. These figures speak for themselves.

FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

KING'S COLLEGE HOSPITAL AND SCHOOL.

GREAT MEN.

[With Plates XLI.—XLIV.]

LORD LISTER, O.M., P.C., M.D., LL.D., D.C.L., D.SC., F.R.C.S., F.R.S.

JOSEPH LISTER was born in 1827 at Upton, in Essex, and was the son of a Fellow of the Royal Society. After studying surgery at University College Hospital, he went to Edinburgh to work under Professor Syme, whose daughter he subseqently married. In 1860 he was appointed Regius Professor of Surgery at Glasgow, where the unhealthiness and mortality of the infirmary wards appalled him. He had followed Pasteur's researches with the greatest interest, and became convinced that the trouble in the treatment of surgical cases was due to the introduction of germs. To prevent this became his absorbing study, and the universal adoption of his principles attests the marvellous insight and skill which he possessed. In 1881 the Royal College of Surgeons honoured itself by presenting him with its medal, and in 1883 Mr. Gladstone conferred a baronetcy upon him, while in 1897 he became the recipient of a peerage, a unique distinction in the history of the medical profession. Lord Lister was awarded the Royal Medal of the Royal Society in 1880, and is the author of various medical books, including his well-known *Principles of Antiseptic Surgery*.

Lord Lister's work in London dates from 1877, when he was invited to fill the chair of Clinical Surgery at King's College, and at the same time to accept the appointment of full surgeon to the hospital. His world-wide reputation as the originator of antiseptic surgery, and his great success and popularity as a teacher, materially strengthened the medical faculty of the college and hospital. Nearly every European nation has

PLATE XLI.

Lord Lister.

Sir Thomas Watson.

PLATE XLII.

Dr. Robert Bentley Todd.

Sir William Fergusson.

paid its tribute to the fame of Lord Lister and his work, and the last, but not least, of the well-deserved honours conferred upon him is his enrolment in the new Order of Merit, established by His Majesty King Edward VII., in 1902, which contains on its roll the names of only eight other distinguished persons. Lord Lister is also a member of His Majesty's Privy Council.

SIR THOMAS WATSON, BART., M.A., M.D., LL.D., F.R.C.P., F.R.S.

Although not officially connected with King's College Hospital, Sir Thomas Watson, as Lecturer on Forensic Medicine and Professor of Medicine at King's College, numbered among his pupils most of the early students at the hospital. He was born in Devonshire in 1792, and received his early education at the Bury St. Edmunds Grammar School. In 1811 he entered St. John's College, Cambridge, and graduated as Tenth Wrangler in 1815. He studied medicine at St. Bartholomew's under Abernethy, and graduated M.D. in 1825. The following year he was elected Fellow of the Royal College of Physicians, and became Physician to the Middlesex Hospital in 1827. His appointments at King's College date from 1831 and 1835. At the College of Physicians he delivered the Gulstonian and Lumleian Lectures, and was elected President in 1862, being re-elected for five successive years.

Sir Thomas Watson's chief literary work was *Lectures on the Principles and Practice of Physic*, a book which went through five editions and which was for thirty years the standard text-book of medicine, distinguished alike for its comprehensiveness and literary excellence.

His practice was large, and in 1859 he was appointed Physician Extraordinary to the Queen, and Physician in Ordinary in 1870. He was created a baronet in 1866 and died in his ninety-first year.

ROBERT BENTLEY TODD, M.A., M.D., F.R.C.S., F.R.S.

Robert Bentley Todd, born in April 1809, was the son of an eminent Irish surgeon. At the early age of 16 he entered Trinity College, Dublin, with the view of ultimately following the practice of the Bar, but, in consequence of his father's death, determined on adopting the medical profession. He

graduated in 1829, and in 1831 became a Licentiate of the Royal College of Surgeons, Ireland. In 1832 he was admitted "ad eundem" at Pembroke College, Oxford. Four years later he obtained his M.D., and in 1838 was made a Fellow of the Royal Society. At a very early age he commenced to lecture on anatomy, thus attracting the notice of Sir Astley Cooper and Sir Benjamin Brodie, and becoming associated with Guthrie in his work; but in 1836, by his appointment to the Chair of Physiology and Anatomy in King's College, he embarked on the course which was most congenial to his tastes, and in which he so distinguished himself. As a physiologist Todd was at once a teacher and an author, and as a lecturer on physiology he was accurate and clear.

As a clinical teacher he was one of the most popular of his day, distinguished alike for accuracy in the observation of disease, correctness of diagnosis and clearness in the expression of his views.

But Dr. Todd worked a striking revolution in certain departments of medical practice, and his views are embodied in the following propositions :—

1. That the notion so long prevalent in the schools that acute disease can be prevented or cured by means which depress and reduce vital and nervous power is altogether fallacious.

2. That acute disease is not curable by the direct influence of any form of drug or any known remedial agent, except when it is capable of acting as an antidote or of neutralising a poison, the materies morbi.

3. That the disease is cured by natural processes, to promote which in their full vigour, vital power must be upheld. Remedies, in whatever form, are useful only so far as they may excite, assist, or promote these natural curative processes.

4. That it should be the aim of the physician to inquire minutely into the intimate nature of these curative processes— their physiology, so to speak—to discover the best means of assisting them, to search for antidotes to morbid poisons, and to ascertain the best and most convenient means of upholding vital power.

Dr. Todd was a man of indomitable energy, and, though seriously ill, persisted in seeing his patients up to the very last.

He died in January 1860, in his consulting room, a few hours only after he had seen his last patient.

PROFESSOR SIR WILLIAM FERGUSSON, BART.

Sir William Fergusson, one of the most skilful and rapid operators of the last century, was for thirty-seven years surgeon to King's College Hospital. A Scotchman by birth, for he was born at Prestonpans in 1808, he received his early education at Edinburgh, and became Fellow of the Edinburgh College of Surgeons. He had at an early age displayed a taste for mechanics, and on this account attracted the attention of Dr. Knox, perhaps the most celebrated teacher of anatomy of his day. His association with Dr. Knox doubtless laid the foundation of his future eminence. In 1840 he succeeded to the Chair of Surgery in King's College, and also received the appointment of Surgeon to the Hospital. But it was in the operating theatre that he especially displayed his wonderful skill, self-possession and coolness, and it was in some of the greater operations of surgery that Fergusson especially showed his power. Of that power one of his dressers said, "It was wonderful to witness the simplicity and skill with which he removed the upper jaw ; his lithotomy was perfect and rapid ; his excisions of the joints, especially of the knee, and his operations on large and deep-seated tumours excited the utmost admiration. He successfully revived the operation of excision of the head of the femur in an instance of incurable disease of the hip-joint, removed the entire scapula with the arm, and, against every opposition, firmly established the operation of excision of the knee-joint in cases of disease, instead of the usual performance of amputation of the thigh. He never displayed more skill than when operating for harelip and cleft palate."

In 1861 Mr. Fergusson was elected on the Council of the Royal College of Surgeons, and subsequently became President of the College. In 1866 he was creaied a baronet, and in the following year he received the appointment of Serjeant-Surgeon to the Queen.

Though reserved and undemonstrative in his manner, Sir William Fergusson was one of the staunchest of friends, and possessed unfailing courtesy and great equability of temper.

He was recognised as one of the original founders and one of the chief ornaments of King's College Hospital.

SIR WILLIAM BOWMAN, BART, F.R.C.S., M.D., F.R.S.

This celebrated surgeon was born in 1816 at Nantwich. He received his early education at the hands of Thomas Wright Hill, father of Sir Rowland Hill, was apprenticed to Joseph Hodgson, surgeon, of Birmingham, and in 1837 entered the Medical Department of King's College. In 1839 he was admitted to the membership of the College of Surgeons, and, in the following year, was elected Assistant Surgeon to King's College Hospital, where he became particularly associated with Richard Partridge. Later he was elected Professor of Physiology and Anatomy at King's College, full Surgeon to the Hospital, and in 1851 Surgeon to the Royal London Ophthalmic Hospital, Moorfields, which post he filled for 25 years. In 1841 he was elected Fellow of the Royal Society, and in the following year he was awarded the Royal medal of that Society in recognition of his anatomical work. He became Fellow of the Royal College of Surgeons in 1844, and in 1867 the University of Dublin honoured itself by conferring upon him the degree of M.D. honoris causâ. He was created a baronet in 1884.

His literary labours included the *Cyclopædia of Anatomy and Physiology* and the *Anatomy and Physiology of Man*, in both of which he was associated with Robert Bentley Todd.

Sir William Bowman died in 1892.

The following extract admirably sums np Sir William Bowman's qualities :—" Sir William Bowman was the father of general anatomy in England, and the brilliant results of his investigations into the structure of the eye, of the kidney, and of the striped muscles were of themselves sufficient to establish a reputation of the highest order. But Bowman had other and equal claims to distinction, for his practical gifts were as great and as fruitful as his scientific attainments. As an ophthalmic surgeon he occupied a unique position. Unrivalled in his knowledge of the ocular structures, in his experience and operative skill, in consultation he was gentle, patient, and thoughtful. Alive to and quickly seizing the salient points

of every case, he was yet very reserved, giving his opinion in a few words, but decisively both as to forecast and treatment."

GEORGE BUDD, M.D., F.R.C.P., F.R.S.

Few names are better known in the medical world than that of Budd, for Mr. Samuel Budd, of North Tawton, Devon, brought seven of his nine sons to the medical profession, and all of them became more or less distinguished ornaments of that profession. George, the third son, was born in 1808, and entered St. John's College, Cambridge, in 1827, changing later to Caius, where he obtained a Fellowship after gaining the distinction of Third Wrangler in 1831. He subsequently pursued his medical studies at Paris, and at the Middlesex Hospital, and in 1840 obtained the degree of M.D. at his old University. In that year he was elected Professor of Medicine in King's College, London, and occupied that chair for 23 years, being elected an Honorary Fellow on his retirement. Dr. Budd became a Fellow of the Royal College of Physicians in 1841, and, as early as 1836, was elected a Fellow of the Royal Society. His contributions to medical literature were numerous and valuable. In referring to his treatise on *Diseases of the Liver*, Dr. Wilson Fox remarks that this " book remains, and must remain, an original work of the highest value, and marking a period." His treatise on *Diseases of the Stomach* is full of valuable observations, careful descriptions of cases, and ingenious argument. Dr. Budd wrote also on Cholera and Scurvy, the outcome of his researches, with Mr. Busk, while physician to the " Dreadnought," seamen's hospital ship at Greenwich. His Gulstonian and Croonian Lectures at the College of Physicians were published in the *Medical Gazette.* Budd was a keen and accurate observer, an original thinker and very clear writer and speaker. He was appointed Consulting Physician to King's College Hospital in 1872, and died in 1882 at the age of 74.

SIR GEORGE JOHNSON, M.D., F.R.C.P., F.R.S.

No more striking personality was ever connected with King's College or King's College Hospital than Sir George Johnson, and a careful study of the portrait, which we are

fortunately able to reproduce, will at once appeal to our readers as that of a professional man gifted with unusual intelligence and decision of character. George Johnson was born at Goudhurst, in Kent, in 1818, and, through early association with an uncle who was in practice in Cranbrook, determined on following the medical profession. At King's College he soon distinguished himself, and gained prizes in almost every branch of medical study. In 1842, he obtained the degree of M.B., gaining the Scholarship and Medal in Physiology and Comparative Anatomy, and two years later took the M.D. Degree at the University of London. He became a member of the Royal College of Physicians in 1846, and was elected Fellow in 1850, serving that College in the offices of Examiner, Censor, Councillor, Goulstonian Lecturer, Materia Medica Lecturer, Lumleian Lecturer, Harveian Lecturer, and Vice-President. In 1862 be became a member of the Senate of the London University, and in 1872 was elected Fellow of the Royal Society. Sir George Johnson's connection with King's College Hospital dates from 1847, when he was appointed Assistant Physician. He became full Physician in 1856 and Consulting Physician in 1886.

Dr. Johnson was made Physician Extraordinary to the Queen in 1889, and received the honour of knighthood in 1892.

In his latest years Sir George suffered from paralysis agitans, but bravely continued his practice and literary work to within two days of his death, which occurred on June 3, 1896.

Sir George Johnson contributed largely to the current medical literature of his day, and did not hesitate to express himself with considerable force and power. He wrote as one who was sure of his position. But his most important contributions to medical science, and consequently to permanent medical literature, were *Notes relating to Bright's Disease of the Kidneys, The Pathology and Treatment of Cholera*, and *The Diagnosis and Treatment of Diseases of the Throat by the Aid of the Laryngoscope.* His latest work was a small book entitled *History of the Cholera Controversy*, in which he successfully maintained the position he had taken up in the cholera epidemic. For years he had been known inside and outside the profession as " Kidney Johnson," but he jocosely

PLATE XLIII.

Sir William Bowman.

Sir George Johnson.

PLATE XLIV.

Professor Richard Partridge.

Mr. John Wood.

on one occasion laid claim to the sobriquet of " Cholera Johnson."

PROFESSOR RICHARD PARTRIDGE, F.R.C.S., F.R.S.

Richard Partridge, the youngest but two in a family of twelve, was born in 1805 at Ross, in Herefordshire. When 16 years of age he was apprenticed to his uncle in Birmingham, where he also acted as dresser to the eminent Mr. Hodgson at the General Hospital. He entered St. Bartholomew's Hospital in 1827, where he sat at the feet of the celebrated John Abernethy. As soon as he became qualified he acted as Demonstrator of Anatomy at the Windmill Street School. and in 1831 was appointed as the first Demonstrator of Anatomy at King's College, eventually succeeding to the Chair of Anatomy, which Professorship he held for 37 years. It was while Partridge was Demonstrator that he was instrumental in bringing to justice the murderers Bishop and Williams, who attempted to sell to him the body of the Italian boy, Carlo Ferrari, their latest victim. These wretches, who had gained a living by " body-snatching " of the vilest form, were executed in December 1831, and their bodies removed for dissection, Bishop to King's College and Williams to St. Bartholomew's.

In 1837 Partridge was elected a fellow of the Royal Society. He also held all the principal posts at the Royal College of Surgeons, having been elected Fellow in 1843, Member of the Council in 1852, Examiner in 1854, Hunterian Orator in 1865, and President in 1866.

He evinced great taste and ability in drawing and became proficient in that art under the able tuition of his brother John, the eminent portrait painter. He thus became specially qualified for the post of Professor of Anatomy at the Royal Academy. Partridge died in 1873 at the age of 68.

JOHN WOOD, F.R.C.S., F.R.S.

Like that of many other surgeons who afterwards achieved distinction, the early career of John Wood was beset with difficulties. Born in 1825, he was the youngest child of a large family, the head of which was not overburdened with wealth, and received a simple education. His business career began by

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his being articled to a solicitor, but this was soon interrupted by an injury to his hip which resulted in permanent lameness. He then became dispenser to the senior surgeon at the Bradford Infirmary, where he acquired sufficient knowledge to enable him to enter King's College in 1846, where his success as a student was almost phenomenal. He soon gained four scholarships and two gold medals, and in 1848 passed the first M.B. examination with honours, gaining the gold medal in anatomy and physiology. For the next 20 years he was invariably to be found in the dissecting rooms, where he acted as Demonstrator of Anatomy, Richard Partridge being the Lecturer. The positions subsequently held by him were assistant, then full surgeon to the Hospital, Professor of Surgery, Lecturer on Clinical Surgery jointly with Lister, and in 1889 Emeritus Professor of Clinical Surgery. He acted on several occasions as examiner for the Royal College of Surgeons, and for the Universities of London and Cambridge, and was elected as Fellow of the Royal Society in 1871. After an unusually brilliant career, during which he rendered most valuable service to King's College Hospital, he died in 1891.

For the drawings and photographs illustrating the two articles on King's College Hospital, I am greatly indebted to Messrs. Bradbury, Agnew & Co., Ltd., the Council of the Royal Medical and Chirurgical Society, and Captain H. S. Tunnard, Secretary of the Hospital, who have either allowed me to select views from their collections, or have given me permission to photograph various parts of the hospital.

H. Willoughby Lyle.

BY-PATHS OF MEDICINE.

ROYAL RELICS.

THE worship of relics is denounced by many worthy persons as a form of idolatry, but the cult has its seat deep in the foundations of human nature. One has only to glance at any museum to see how jealously relics of all kinds are treasured. The abstraction of Nelson's breeches from the Greenwich Hospital was denounced as an act of sacrilege against the nation. The doctors who ministered to Gambetta in his last illness divided his limbs and viscera among themselves after his death, and the question what had become of his heart at one time threatened to become one of the mysteries of history. Paul Bert, who assuredly cannot be suspected of superstition, confided to a journalist of Cahors, Gambetta's native town, that, in the scramble for relics of the great Tribune of the People, he had secured the heart. With pious care he kept it sealed up in a glass vessel, which, for safety, was enclosed in a fire-proof casket ; it seems to have been exposed occasionally, doubtless with appropriate rites, to the veneration of devotees. Great alarm was caused among them by a rumour that the precious relic had been carried off to Tonquin, when Paul Bert went to that colony to enter on his duties as Governor, and that it had been lost on the voyage. After a period of mourning, good tidings of great joy came to them, and they learnt that the sacrosanct viscus had never left France, but had been deposited in safe hands, and that on Madame Bert's return to France it had been given into her keeping. Doubtless the lady has a due sense of the importance of her trust, but the responsibility is great, and the faithful must feel that the State is the proper guardian of a national treasure.

It is said that the heart of the great Napoleon was put aside at the *post-mortem* examination of his body, and could not afterwards be found. It may have been, as was suggested at the time, devoured by rats, who may be supposed to have brought an exceptionally keen appetite to their supper, as it

3 A 2

is not every night they have such a delicacy as an Emperor's heart. It is not improbable, however, that the heart may have been stolen by some relic-hunter. Collectors of such curios have always been particularly unscrupulous ; mediæval history is full of their misdeeds. Napoleon's heart is, however, as far as we are aware, without a shrine.

Of another heart, venerated by many as royal, there is a more definite history. The body of Louis XVII., the unfortunate child, who is generally believed to have died in the Temple during the Revolution, was examined by one of the leading surgeons, Philippe Joseph Pelletan. He kept the heart, which at the Restoration he tried to induce the King to accept as a relic. For some reason or other he did not succeed. Perhaps the authenticity of the relic was looked upon as doubtful, or Pelletan himself did not find favour in the royal eyes. Pelletan died in 1829, leaving the restoration of the relic as a sacred duty to his son, who was also a professor of surgery. Apparently he too found it difficult to persuade the Royal Family to receive the heart as their own flesh. Somehow it seems to have got into the hands of Monseigneur Quelen, Archbishop of Paris. The story is that when that prelate's house was sacked during the Revolution of July 1830, word was sent to Pelletan, who at once went to the house which was occupied by the National Guard. Making himself known to the officer in command, Pelletan went to the Archbishop's study where, amidst the papers and other things with which the floor was strewn, he found the box containing the heart ; he took it away with him, but had no time to look for the documents establishing its authenticity which had been with the box. When the disturbance of the political atmosphere had abated, Pelletan, in obedience to his father's instructions, resumed with the Comte de Chambord the negotiations begun with Louis XVIII. and Charles X. He died in 1845, and the duty which he had been unable to discharge was taken over by his brother Gabriel Pelletan. He, too, passed away in 1879, leaving to those who came after him, as a condition of their inheritance, an injunction to restore the heart. The Comte de Chambord insisted on adequate proof, but before this was forthcoming, he joined the long line of his royal ancestors. Where is the heart now ? No one

seems to know, but it is conjectured that it is in the custody
of some notary. The apparent unwillingness of the Bourbons
to accept the poor little fragment of humanity as belonging
to their august family is regarded by some as a proof of
their belief that the boy who died in the Temple was not
Louis XVII. The mystery has, indeed, never been thoroughly
cleared up ; but apart from this, it appears that they were
amply justified in insisting on the most irrefragable proof
before accepting a heart that had been in pickle for years as
that of a boy king who had died under circumstances which
made its preservation improbable. Moreover, it is by no
means easy to see how such proof could be produced.

Some twelve or thirteen years ago a number of royal relics
were accidentally discovered in Paris. In moving some old
dust-covered boxes on a shelf in the library of the Louvre
one of them fell to the ground and discharged its contents.
These were old bones, among them being a scapula, a femur,
a tibia, several vertebræ, a skull and an edentulous jawbone.
The bones were labelled, and those present were amazed to
read on them such inscriptions as " Scapula of Hugues Capet,"
" Femur of Charles V.," " Tibia of Charles VI.," " Vertebra of
Charles VII.," " Rib of Philip the Fair," " Rib of Louis XII.,"
" Lower Jaw of Catherine de' Medici," and so forth. It was
known, of course, that the tombs of the old Kings of France
had been violated in 1793, and their bones scattered. It was
known, too, that a Benedictine monk, Dom Porrier, had
written an account of the disinterment, at which he had
been present, and that he had taken some pains to identify
the relics ; it was also known that a Chevalier Alexandre
Lenoir had gathered together as many as he could find with
the purpose of forming a museum of curiosities. This museum,
opened in 1793, was closed at the Restoration.

At Lenoir's death the bones passed into the possession of
an old friend, Ledru, then Mayor of Fontenoy-aux-Roses.
Ledru died in 1834, and in 1843 his widow gave the bones
to her nephew, one Le Maire. Madame Lenoir died in 1848,
and it was then, according to his own account, that Le Maire,
on hearing the list of the curiosities in his possession, first
learnt the history of the bones. When De Nieuwerkerke
was entrusted by Napoleon with the task of reorganising the

Museum of the Louvre, Le Maire sent the bones to him. It appears to have been intended to place them in the Museum of Sovereigns. In 1871, however, the Commune broke up the Museum, but the royal bones by accident again escaped destruction. It is possible that they are genuine ; but here, again, the stream of evidence is somewhat muddy, and runs underground for so great an extent of its course that probably the safest attitude is one of philosophic doubt.

A royal relic of unquestionable genuineness was for some time in the possession of Sir Henry Halford, who, having been physician to four sovereigns and many princes and princesses of the blood, had seen living royalty at closer quarters than is given to most men. This was a portion of the vertebra in the neck of Charles I. which was severed by the headsman's axe. The relic came into his possession when the coffin of the Royal Martyr was opened in the early part of the last century with the object of identifying the body. It was known that his body had been hastily buried in the vault of St. George's Chapel, Windsor, but the exact spot could not be discovered. Pope alludes to this in the lines in which he invoked the muse to—

Make sacred Charles's tomb for ever known
(Obscure the place, and uninscribed the stone).

When the mausoleum built by George the Third in the tomb house was completed in 1813, it became necessary to construct a passage to it from under the choir of St. George's Chapel. In doing this, an opening was accidentally made in one of the walls of the vault of Henry VIII., through which the workmen saw not only the two coffins, which were supposed to contain the bodies of that monarch and Jane Seymour, but a third one covered with a black velvet pall. The coffin had evidently been thrust into the vault through an opening hurriedly made and as hurriedly repaired. With such haste had the proceeding been carried out that the coffin of Henry VIII. has been broken open by the violence with which the new one had been introduced. On April 1, 1813, an examination was made in the presence of the Prince Regent, who was accompanied by the Duke of Cumberland, Count Munster, the Dean of Windsor, Mr. Benjamin Charles Stevenson, and Sir Henry Halford.

The following account of what was found is mostly in Sir Henry's own words :— [1]

On removing the pall a plain leaden coffin with no appearance of ever having been enclosed in wood, and bearing an inscription " King Charles, 1648," in large legible characters on a scroll of lead encircling it, immediately presented itself to view. A square opening was then made in the upper part of the lid, of such dimensions as to allow a clear sight of the contents. These were an inner wooden coffin, very much decayed, and a body carefully wrapped in cere-cloth, into the folds of which a quantity or unctuous or greasy matter mixed with resin, as it seemed, had been melted so as to exclude as effectually as possible the external air. The detachment of the cere-cloth proved to be a matter of great difficulty, but at length the whole face was exposed. The skin was dark and discoloured ; the forehead and temples had lost little or nothing of their muscular substance ; the cartilage of the nose was gone ; the left eye in the first moment of exposure was open and full, but vanished almost immediately ; and the pointed beard, characteristic of the time of Charles's reign, was perfect. The shape of the face was a long oval ; many of the teeth remained, and the left ear was entire. All present were struck by the resemblance of the countenance to Vandyke's portraits of Charles and to the coins of his reign. When the head was disengaged from the attachments which confined it, it was found to be loose and was taken out and held up to view. It was quite wet—with blood, Sir Henry thought. The back part of the scalp was perfect, and had a remarkably fresh appearance, the pores of the skin being more than usually distinct as they are when soaked in moisture ; and the tendons and ligaments of the neck were of considerable substance and firmness. The hair was thick at the back part of the head, and in appearance nearly black. A portion of it which was cleaned and dried, was found to be of a beautiful dark brown colour. The hair of the beard was of a redder brown. On the back part of the head the hair was not more than an inch in length, and had probably been cut so short for the

[1] Essays and Orations read and delivered at the Royal College of Physicians, to which is added an account of the opening of the tomb of Charles I. London, 1831, p. 162.

convenience of the headsman. On holding up the head in order to examine the place of separation from the body, the muscles of the neck had evidently retracted themselves to a considerable extent ; and the fourth cervical vertebra was found to be cut transversely through its substance, leaving the surfaces of the divided portions perfectly smooth and even. The head was restored to its place and the coffin was soldered up without any examination being made of the body below the neck.

After the coffin had been soldered up, it was found that the portion of the vetebra, which had been cut through, had become separated from the neck and fallen aside unnoticed. The Prince Regent presented the relic to Sir Henry Halford, who had a case carved of lignum vitæ lined with gold, with a fitting inscription inside the lid, made for its reception. It was shown to so many persons that the fact of such a treasure being in the possession of a private family was made the subject of unfavourable comment.

Many years after Sir Henry's death, his representative, Sir Henry St. John Halford, gave it into the hands of our present gracious Sovereign, then Prince of Wales, who, it is understood, returned it to the vault, and deposited it in its case on the coffin of Charles I., where it has reposed.

The remains of Cromwell have had a stranger fate than those of his royal victim. Torn from their resting-place among the tombs of kings in Westminster Abbey, the head still lies unburied after two centuries and a half. There is much controversy as to the facts, but the balance of evidence seems to be that this really interesting relic is in the possession of Mr. Wilkinson, of Seal, near Sevenoaks. There are several rival claimants, and it is possible that, as in the case of the heads of not a few saints, the relic may have been divided by accident or the eagerness of devotees into two or more portions.

It may be recalled that two collectors claimed, on apparently indisputable evidence, to be in possession of the head of Richelieu. On an examination being made by experts, it was found that one had the face while the other had the back of the head: when the two portions were put together they formed a perfect head.

Reviews of Books.

Ureteric Meatoscopy in Obscure Diseases of the Kidney. By
E. HURRY FENWICK, F.R.C.S., Surgeon to and a
Lecturer on Clinical Surgery at the London Hospital.
London : J. and A. Churchill. Pp. 219. 14 plates and 43
figures. Price 6s. 6d.

MR. FENWICK'S work in the field of cystoscopy is so well
known that the present record of his experience in one section
of the subject will be received with interest.

The present volume consists of a cystoscopic study of the
openings of the ureters and the urine discharged from them in
various diseases of the kidney and ureters. The theme may be
crudely expressed as follows. Certain diseased conditions of
a kidney, especially stone and tuberculosis, may be accom-
panied by changes at the orifice of the corresponding ureter, or
visual changes in the urine issuing from this opening, and, if
present, a certain clinical value may be accorded to these
phenomena.

Mr. Fenwick elaborates this theme by a very interesting
and able discussion of clinical material and personal observa-
tion. A large number of cases are quoted in support of the
different points which the author raises, and the inferences he
draws from the cystoscopic appearances are substantiated in
the majority of cases by operative or other evidence.

The clinical material alone forms a very valuable contribu-
tion to the literature of renal surgery, and in addition Mr.
Fenwick draws some very important inferences from his obser-
vation of the ureteric orifices. It is to be noted that the changes
observed are not to be found in all or perhaps even in a
majority of cases, and that they require the support of other
clinical evidence in forming a diagnosis ; and further, that more
than ordinary skill in cystoscopy is necessary for their obser-
vation. This certainly reduces their importance as routine
means of diagnosis, but it does not detract from the value of
Mr. Fenwick's work.

In addition to the " ureteric meatoscopy " the book contains

many interesting clinical observations in regard to diagnosis and prognosis in renal disease. In an appendix the history and "cystoscopic findings" in 50 cases of urinary tuberculosis are given. The plates, some of which are coloured, are beautifully reproduced. The book is an admirable and original study in cystoscopy in its application to diagnosis and operation in renal disease. It will appeal to those experienced in cystoscopy rather than to the general body of the profession.

Enlargement of the Prostate, its Treatment and Radical Cure.
By C. MANSELL MOULLIN, M.D. Oxon., F.R.C.S. Senior Surgeon and Lecturer on Surgery at the London Hospital; Member of the Council of the Royal College of Surgeons; Examiner in Surgery in the University of Cambridge. London: H. K. Lewis. Pp. xii and 204. 8vo. Price 6s.

THIS is the third edition of Mr. Moullin's well-known book on enlargement of the prostate. Originally based upon his Hunterian Lectures of 1892, the work has been revised and somewhat extended as it has passed through three editions. It is unnecessary to pass in review the details of the work which has already taken its position in medical literature. Only a few points need be noted.

The recent more accurate description of the position of the prostatic plexus between the layers of the sheath, instead of between sheath and capsule, is adopted. In discussing the histology of the enlarged prostate, the view is stated that the change is not inflammatory nor a mere hypertrophy, but "essentially a fibro-adenomatous growth." Later, however, the author says : "These masses are not tumours at all, in the proper sense of the term. They are merely pronounced local growths even when they form apparently the whole of the enlarged prostate." The meaning of this statement is not very clear from a pathological standpoint.

In regard to the causes of prostatic enlargement the author discusses three theories. Other theories, he says, have been disproved times without number. The three theories which are "supported by the weight of such authority that they cannot be lightly dismissed" are Velpeau's theory of the analogy between prostate enlargement and fibroid disease of the uterus, Guyon's theory that the enlarged prostate is part of

a general fibrosis resulting from arteriosclerosis, and Harrison's theory that the enlargement is secondary and compensatory to changes in the bladder. These theories are not, however, satisfactory, and Mr. Moullin suggests that prostatic enlargement is dependent in some way upon the testicle. " It is almost certain, therefore, that this abnormal overgrowth must be in some way dependent upon the master organs of the male sexual system." What the relation is he does not define.

In regard to the loss of power of the bladder muscle in prostatic obstruction the author quotes Sir Henry Thompson's statement that two years' catheter life is sufficient to cause permanent loss of contractile power. We believe, however, that Sir Henry Thompson saw reason to change his view on this matter before his death, and that this change in view was published in a recent paper.

In regard to radical treatment the author recognises only partial prostatectomy, and states that he will only deal with those methods which he has found of practical use. A sufficient number of varieties of operation is given, however, to cover the whole ground of the operative treatment of enlarged prostate. The older methods occupy, we think, a little more space than might be expected, and this somewhat to the detriment of more recent work. Mr. Moullin will find a decreasing number of surgeons to agree with his statement that the operation of prostatectomy owes its present position to McGill's account of it at the Clinical Society in 1888, and the British Medical Association of 1889. The author surely overlooks a period of about ten years during which prostatectomy was put aside for other measures.

Bottini's operation (electro-cautery) is recommended for some cases, and castration is fully discussed and also advocated. The author admits a high mortality from the latter operation. He advances the factors of old age, arterial degeneration, sepsis, and the fact that some of the deaths were not immediately due to the orchidectomy, but occurred after it, and lastly, that all the operators were not of equal experience as tending to make the mortality appear too high. The latter argument applies, of course, to the collected statistics of every operation in surgery, and has no special relation to orchidectomy. The other arguments apply to the statistics of all the operative measures affecting the prostate, so that for the purpose of

comparison the figures must stand as they are. Division of the vasa-deferentia is discussed, but is considered unsatisfactory.

A short paragraph mentions Freyer's work under this heading.

The anatomical part only is illustrated. The book is written in a fluent and polished style, and is read easily and without tedium. The present edition will retain the position gained by previous issues.

The Differential Diagnosis of Syphilitic and Non-syphilitic Diseases of the Skin. By GEORGE PERNET. London : Adlard and Son. Pp. xi and 219. Price 6s. 6d.

THE author states in his preface to this small volume that it is derived from a paper read before the Medical Society of University College Hospital, and that it was afterwards expanded into book form. The text shows obvious signs of its having been a more or less colloquial paper in its original form, and we think in this particular instance that it constitutes a serious disadvantage to the book. Apart from the debatable question whether there is any place for a book with these aims, there can be no doubt that, in a treatise on differential diagnosis, the descriptions should be of the very clearest, and the English most precise. As a matter of fact the converse of this is what we find. In some instances the peculiar style is merely humorous as in the following :—"In the former case, a living child is not necessarily born ; it may be dead or be born at seven months or so and not survive." It is difficult to say how one can obtain a living child without its being born or how a living child can be dead, but it is easy to understand the author's intentions. In the paragraph on Profeta's law it has proved to the reviewer quite impossible to understand what the author really does mean, although the paragraph has been read several times. To those entirely unacquainted with skin eruptions there may be some slight use in the volume, but it is difficult reading, and not detailed enough for a work of reference.

Notes by the Way.

The Prevention of Consumption. THE campaign against consumption initiated by THE PRACTITIONER has now been carried on with considerable energy for several years. A good deal has been done, particularly in bringing the importance of the subject home to the public and to sanitary authorities. So far the work has necessarily been of the nature of preparation rather than of actual achievement ; and the time has now come when the crusade against Tuberculosis should enter on a new phase. Large as has been the measure of public support given to the National Association for the Prevention of Consumption and other forms of Tuberculosis, its activity is unhappily crippled by lack of the sinews of war. It is earnestly to be hoped, therefore, that the meeting to be held at the Mansion House on May 17 will stir the public heart to keener sympathy with the work of the Association, and have the effect of filling its depleted war chest. There is still a considerable section of the medical profession that holds itself aloof from the movement ; there are too a few who denounce it, partly because the movement is not confined to the medical profession, partly, it would seem, for no better reason than the tendency, characteristic of minds of a certain type, to look upon everything that is as wrong. With the latter class no argument is of any avail ; as artists see things through their temperament, so these unfortunate people see things through their temper. The other objection, if more specious, is scarcely more reasonable. To say that the profession exists not for itself, but for the public, would appear to be a truism, but the idea that the profession is something sacro-sanct, which is likely to be made unclean by contact with the outside world is deeply ingrained in the less enlightened members, of our fraternity. Whatever may be thought of sacerdotalism in the sphere of theology, there can be no doubt that medical priestcraft is mischievous as well as foolish. A newly-fledged doctor naturally expects the world to admire his

plumage. Most men outgrow this youthful conceit, or have it knocked out of them, but some there be who can never forget that they once passed an examination of some kind, and thereby gained the privilege of appending certain alphabetical symbols to their names. These are not, as a rule, the men who adorn the profession ; rather do they get from it whatever they possess in the way of ornament. As without their profession they are nothing, naturally they regard it, and wish it to be regarded by others, not merely as an "art and mystery" in the old sense of the words, but as a sanctuary from which the profane must be jealously excluded. In the days, when something of its old priestly associations still clung to medicine, this attitude was intelligible. Even then, however, it hindered progress and fostered charlatanism. Now that the healing art has emerged from the dim religious light of mysticism into the full glare of scientific day, it is seen in its true perspective in the general scheme of human things. If it has lost in artificial dignity it has gained immeasurably in usefulness. And the more its realm expands, the more public must it become. If it disdains association with lay folk in work for the common weal, it fails to fulfil its true mission. Had not laymen taken an active part in the great sanitary movement of the Victorian age, the medical profession by itself could have done little or nothing. Without the co-operation of the public the scourge of consumption cannot be abated. By putting itself at the head of the movement and directing its course, the profession is not only working in the way in which it can be most useful to mankind, but is also enhancing its own importance and true dignity.

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The Isolation of Poor Consumptives. IT has been said that the time has come when the campaign against consumption should enter on a new phase. The key to the position is, as has often been pointed out in this journal, to attack the disease among the poor. It is among them that the deadly germ find the best soil for its growth, and it is from them that it spreads to the well-to-do. The treatment of consumption among the rich presents comparatively little difficulty, because the sufferers can be placed in the most favourable environment before the disease has passed

beyond the curable stage. The poor have to live under conditions which give them no chance of recovery. If the spread of the infection is to be checked, the isolation of poor consumptives is the first step toward that end. The matter must be tahen in hand by a public authority. For London, Sir William Broadbent suggests the Metropolitan Asylums Board, and it is certain that in that direction a new field of usefulness would be opened to that body which would help to justify its somewhat questionable existence. The Local Government Board will, of course, have to be the moving power in any such scheme, and that department usually seems to have a difficulty in getting its own wheels in motion. There is, however, ground for hope that something will be done. The National Association approached Mr. Long a little time ago, and received from him assurances which were satisfactory—as far as they went. Sir William Broadbent has stated to an interviewer that he is hopeful that Mr. Gerald Balfour will give sympathetic attention to the proposal. A joint deputation from bodies representing medical officers of health and from the National Association has laid its views before the Metropolitan Asylums Board, and this action will doubtless be followed up by a further appeal to the Local Government Board. The first step would be to provide accommodation for advanced cases among the denizens of the slums. A necessary preliminary would, of course, be notification, which, to be effective, must be compulsory ; and an equally necessary consequence would be the thorough disinfection of the house from which the sufferers are taken. In short, consumption, in the overcrowded tenements of the poor, has been demonstrated to be a serious danger to the public health ; voluntary effort has done all that can be expected of it, and the time has come for the intervention of public authority.

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Cancer Cures.

THE recent publication in a highly respectable medical journal of a case in which a man is said to have cured himself of cancer of the tongue by the combined internal and external use of a decoction of violet leaves, has naturally enough excited a good deal of interest amongst the public. All sorts and conditions of men and women are writing to the papers on

the subject. We are reminded of the case of a lady of title living at Maidstone, who, two or three years ago, was cured of a growth in the throat by the same treatment ; and of another lady residing at Dover, who was thereby freed from three distinct tumours in the side, supposed to spring from the liver. We mention these three cases because in them the evidence is fairly definite. When carefully sifted, however, little that is solid remains. In the case of cancer of the tongue, it is admitted that no microscopic examination of the growth was made ; hence, in the words of the physician who reports the case, "it proves nothing certainly." Why so essential a point in scientific diagnosis was overlooked is not explained, and many will doubtless agree with us in thinking it regrettable that the case,"suggestive and interesting" as it may be, should have been published without this necessary guarantee of genuineness. We all know that mistakes are not seldom made by men of the greatest experience and in hospitals where there is every facility for clinical research. Even the microscopic test is far from infallible. In the case of the Maidstone lady it was ambiguous, and those who were in the best position to form a judgment as to the nature of the disease were led to the conclusion that the growth was not cancerous. Violet leaves have been tried in cases of malignant disease by many medical practitioners without any result worth recording. It might be well, however, if the remedy were tested on a sufficiently large scale to decide the question once for all. The Middlesex Hospital, where all methods that offer the faintest promise of success are tried, would be the proper place for the experiment.

Quite recently another journal of high scientific standing published a paper in which very beneficial effects in cancer are attributed to cinnamic salts. Here, again, one seeks in vain for any evidence of cure ; and the relief from pain and prolongation of life said to have been brought about are no whit more remarkable than the recorded effects of other remedies. Oil of cinnamon, it may be pointed out, is not a new remedy ; and it is, we believe, one of the many which have been tried at the Middlesex Hospital and found wanting. Otto Schmidt's serum has passed away, and Doyen's will probably soon follow it into oblivion. It may be admitted that all these things may

do some good, in one way or another, in certain cases. The fact appears to be that anything which excites reaction of the right kind in and about the seat of disease is in greater or lesser degree beneficial. But what the right kind of reaction is we do not know ; and if we did know, we should yet have to learn how and when it is to be applied. In the meantime it must be confessed that there is still but one cure for cancer— the knife. The best hope of battling successfully with that terrible scourge lies, we think, in the direction of prevention rather than of cure.

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THE recent death of Dr. J. F. S. Fowler,
A Victim of War Surgeon to the Colonial Hospital at George-
Office Injustice. town, British Guiana, recalls a shameful
story of War Office injustice. It was fully told in THE PRACTITIONER for January 1896, and the buried scandal need not be exhumed. It is sufficient to say that Dr. Fowler, after a period of nine years' excellent service as a medical officer of the Army had the misfortune to be mixed up in a scandal, his only connection with which was that, he had interfered to stop the misconduct of some young officers. For this he was punished with the loss of his commission, and the forfeiture of the gratuity of 1,250*l.* to which, in a few months, he would have become entitled. In short, as far as the War Office can ruin a man, he was ruined. There can be little doubt that this monstrous injustice was perpetrated mainly because the case seemed to offer a chance of venting the spite against medical officers which the " Wolseley gang," at that time predominant, were at no pains to hide. The aid of Parliament was invoked to redress the wrong, but Mr. Brodrick, then Secretary of State for War, made a Government question of the matter, and the injured doctor was sacrificed to party discipline. That there was not the slightest stain on his personal or professional character was shown in the most decisive manner by the fact that he was at once offered an appointment in the Colonial Service by Mr. Chamberlain. The duties of that post were discharged by Dr. Fowler, till the time of his early death, with a diligence and efficiency which earned for him the esteem and confidence of his official chiefs, and the

warmest regard of his professional brethren. His heart was in his work, and in him the Army lost an officer of the type which it can least spare.

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The Surgical Conscience. SOME little time ago Dr. Coyteux-Prévost, of Ottawa, read before the Medical Society of Montreal a paper with the suggestive title " Among the Tombs." It was in fact a meditation on death following operation, and the author eased his conscience by recounting the fatalities which had occurred in a series of a thousand operations. The total number is 59, and the list includes several cases in which pieces of gauze or instruments were left in the abdomen, others in which death was due to hæmorrhage, to septicæmia which should have been prevented, and to delay in operating. Dr. Coyteux-Prévost pushed candour to the point of saying that he deserved to be stoned, but he added significantly, " Let that surgeon cast the first stone who does not carry around with him a little cemetery in some corner of his memory." We think the stones might be much better used to build a monument to the surgeon, who had the courage to publish his mishaps, in order that his brethren might avoid the pitfalls into which he had stumbled. If all were to do likewise, the cemetery of memory would soon be empty, or at any rate it would no longer be haunted by ghosts.

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A Practitioner's Confessional. IN the school of experience we learn more from failure than from success, because the failure is our own, while the success should often rightly be credited to chance. As St. Augustine said of vices, we can out of our mistakes make a ladder whereby we can mount ever higher towards the perfection of our art. How much firmer and taller would be the ladder if everyone contributed material for a rung or two ? There is no need, however, for a practitioner to do public penance like the Canadian surgeon. All the benefits of confession can be secured without the penitent standing clad in a white sheet with a candle in his hand. It has occurred to us that a " Confessional" where mistakes likely to be a warning to others would be a useful addition to a journal whose aim is to help the practitioner. We therefore invite our readers to report for publication cases

of error in diagnosis and in practice, with sufficient detail to make them instructive, but without anything that could lead to the identification either of the practitioner or the patient.

Correspondents may rely on the absolute discretion of the Editor, who will receive their confidences *sub sigillo*. No practitioner need be ashamed of having erred, for Napoleon's saying about generals, that he is the best who makes fewest mistakes, applies with equal truth to doctors. The object of the " Confessional " is to make our mistakes aids to victory.

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Competitions. THE number of letters we continue to receive on the subject of our Prize Essays and Problems leaves no doubt that the competitions are a very popular feature of THE PRACTITIONER. The number of essays grows from month to month, and in regard to the solutions of medical problems the result has far surpassed our anticipations. It has been suggested that model solutions should be published. We venture to think, however, that this lies altogether outside the province of a journal. The editor's stool is not a professorial chair; his function is not so much to teach as to supply his readers with the elements of thought and provide an arena in which questions of medical science still unsettled may be debated by all who have anything profitable to say. For obvious reasons we do not feel justified in publishing diagnoses of the cases propounded, but we may say that, in adjudicating on the answers, special consideration is given to the method by which the diagnosis was arrived at, as well as for the correctness of the result.

The result of the March competitions is as follows :— The best essay was sent in by Dr. F. S. Bottomley, Boscombe. The best answers to the three questions were written by Dr. R. Allan-Bennett, Saltburn-by-the-Sea.

Practical Notes.

COLD IN THE HEAD.—In answer to our request, Sir William Whitla, M.D., has sent us the following practical note on the way he would treat a common cold in the head :—

"A common cold in the head" is nearly always part of an epidemic catarrh, but seldom is it to be regarded as simple congestion caused by the exposure of the mucous membrane to a very cold atmosphere. It may be accepted, therefore, in the great majority of cases, as almost certainly the result of microbic infection.

This consideration affects treatment, and explains the fact that the condition is a self-limited one. In most cases it will terminate as speedily, if let alone, as if attacked with the most heroic measures. Abortion of the symptoms cannot be counted upon by any method of treatment, and the use of remedial agents should be restricted to those cases where the symptoms are so severe as to cause marked inconvenience or distress in very sensitive patients. Ferrier's snuff, with the addition of a little cocaine, may be used, but the probability is that, though the symptoms may be thereby relieved, the duration of the attack will be prolonged. A weak solution of carbolic acid in water in the form of spray (1 in 100), or in petroleum used in the atomiser is the best routine treatment. Where great fulness and sneezing are experienced, an inhalation of Friar's balsam with succus conii, 1 part of each in 50 of boiling water, may be used. All agents which check secretion aggravate the distress ; quinine, morphia, and belladonna are consequently contra-indicated.

After a hot bath the patient should be confined to his room and get a mixture like the following :—

Tartar Emetic, 2 grains ; Mindererus Spirit, 4 oz. ; Morphia, 1 grain ; water to 10 ozs. A tablespoonful every two hours. The morphia here is unobjectionable when combined with the antimony. If fever be present, 2 minims of tincture of aconite may be added to each dose. which may be given hourly for 6 or 8 times.

BRONCHIAL ASTHMA.—It is important to remember that the term asthma is usually employed to indicate some form of spasmodic dyspnœa. Since this is so, it is obvious that there will be several causes of asthma, and consequently a number of clinical varieties, which may be distinguished as follows :—*Cardiac asthma,* due to cardiac disease, especially dilatation of the cavities. *Renal asthma,* which occurs in urœmia, and is usually known as urœmic dyspnœa. Attacks of this kind are generally nocturnal; the patient sits up in bed and gasps for breath, and is as much distressed as in true bronchial asthma. *Hay asthma,* which is associated with hay fever, and may indeed be accompanied with ordinary bronchial asthma. *Thymic asthma* is another name for laryngismus stridulus, and was so called because it was thought at one time that the laryngeal spasms were brought about by reflex irritation due to enlargement of the thymus gland. *Bronchial or spasmodic asthma* is a condition in which there is a marked neurotic element, and is due to sudden spasm of the unstriped muscles which exist in the walls of the bronchi and bronchioles, and which are innervated by the pneumogastric nerves. At the same time there is a swelling of the bronchial mucous membrane, which is often associated with an increased secretion from the mucous membrane of the smaller bronchioles. This condition has been called by Curschmann—*bronchiolitis exudativa.* In severe attacks of spasmodic asthma, the paroxysms usually occur at night. During the day the patient commonly suffers from cough, sometimes accompanied with considerable wheezing. In more chronic cases the disease is usually associated with chronic bronchitis and emphysema. The treatment of bronchial asthma may be conveniently described under two headings :—

(1) That to be resorted to during the acute attack ;
(2) That to be adopted during the intervals of the attacks, in order, if possible, to prevent their recurrence.

During the asthmatic attack a little chloroform should be inhaled. This produces rapid relaxation of the bronchial muscles. Hypodermic injections of morphia with cocaine, or morphia ($\frac{1}{3}$ of a grain) and atropine ($\frac{1}{100}$ of a grain) will bring about the same effect, but this remedy should be reserved for

severe paroxysms. Stramonium cigarettes may also be used. A drachm of a powder consisting of powdered Belladonna, Stramonium, and Hyoscyamus leaves with some potassium nitrate, burnt and the fumes inhaled will often bring about relief. Relief may also be obtained by the inhalation of three to five minims of nitrite of amyl from a crushed capsule. Between the attacks the following medicine may be given, the potassium iodide sometimes acting almost as a specific :—

> ℞ Potassii Iodidi - - - - - - gr. x.
> Tincturæ Lobeliæ - - - - ʒ ss.
> Vini Ipecacuanhæ - - - - - ♏ xii.
> Aquæ Chloroformi - - - - ad ʒi.
> Misce. Ft. Mist.

Two tablespoonfuls to be taken three times daily after food.

The following is a very good formula recommended by Dr. Burney Yeo :—

> ℞ Potassii Iodidi - - - - - gr. xii.
> Extracti Stramonii - - - gr. ⅙.
> Spiritus Chloroformi - - - - ♏ xx.
> Spiritus Ammonii Aromatici - - ♏ xx.
> Aquæ - - - - - - ad. ʒ ss.
> Misce. Ft. haust.

The draught to be taken just before going to bed.

Two other considerations must be kept in mind. The *place of abode* must be chosen which is found to suit the patient best, some persons suffering from asthma prefer high dry altitudes, others the seaside, some find that they are better in towns, others in the country. The *diet* must be carefully regulated, and, as a rule, heavy meals should not be taken in the evening. Dyspepsia is often the starting-point of an attack. Hot whisky with a few minims of spirits of chloroform will often cause relaxation of the bronchial muscles and so stop a commencing attack.

THE PHYSIOLOGY OF THE DIGESTIVE PROCESS—SALIVARY DIGESTION.—During the last few years there has been a great advance in our knowledge concerning the process of digestion. Many physiologists have been busily engaged in research as to the method of secretion of the digestive juices,

with the result that many new facts have been discovered. It is our object to briefly indicate the chief changes which the food undergoes in the alimentary canal, and to set before the busy practitioner the more recent views, which have been advanced by those who are actively engaged on this subject : thus pointing out their bearing upon practical medicine. In reference to mastication, the more complete the process the more readily will the saliva and, later, the gastric juice get at the particles of food to carry on the digestive process. One of the most frequent causes of dyspepsia is incomplete mastication, due either to insufficient time being allowed for the process, as so frequently occurs in those persons who habitually bolt their food, or to the deficiency of the teeth. Carious teeth tend to dyspepsia in two ways, firstly by interfering with mastication, and, secondly, by producing poisons which are swallowed with the food, and which interfere to some extent with gastric digestion. The particles of food in the mouth are lubricated by the saliva, which, in virtue of its mucin, derived mainly from the submaxillary and sublingual glands and the small mucous glands lining the mouth, causes the adhesion of the particles, so as to form a bolus, which is finally lubricated, and then placed on the back of the tongue, ready to be swallowed.

Soluble substances in the food, such as sugar and salt, are dissolved by the water contained in the saliva, and may therefore be readily tasted. Starch contained in the food, which has been previously cooked, is acted upon by the ptyalin, the amylolytic ferment of the saliva, and is converted into amydulin or soluble starch, then into the dextrins (erythrodextrin and achröodextrin), and finally into one of the sucroses, namely, maltose, a sugar having the formula $C_{12}H_{22}O_{11}$, which will readily reduce Fehling's solution, and give other reducing sugar tests. All kinds of food cause a flow of saliva, rich in mucin, from the submaxillary and sublingual glands, but dry food causes an increased flow of very watery saliva from the parotid gland, from which the secretion contains no mucin. The secretion of saliva from the submaxillary, sublingual, and parotid glands is under the control of the nervous system, and in this connection the psychical element in relation to salivary secretion must be kept in mind, for, provided an individual is

hungry, the smell of food, the sight of food, the thought of food, and the administration of food, all cause an increased flow of saliva. If dry food be taken, the parotid saliva secreted is abundant. It has been quite recently shown that, after the food is swallowed, it lies for at least two hours at the fundus of the stomach, because peristalsis is absent from this region during the early stage of digestion. Here the amylolytic action of the ptyalin goes on for a while, so that the digestion of cooked starch continues. After a time free hydrochloric acid is produced in the cardiac portion of the stomach, and this destroys the ptyalin, so that its action is then stopped.

The practical application of salivary digestion is mainly in connection with bread. In the making of bread the starch is cooked, so that the saliva can more readily act upon the more digestible part, namely, the starch granulose. Moreover, the introduction of yeast causes the bread to rise and become light, so that the saliva can easily get at the particles. The crust of bread and the surface of toast contains the dextrins and some dextrose. These are then more easily digested than the crumb of the bread itself. It must be remembered, however, that bread contains also about 8 to 10 per cent. of proteid in the form of gluten, and this is obviously digested in the stomach. Gluten does not exist as such in flour, but is formed by the addition of water from pre-existing globulins in the flour. The reaction of saliva is alkaline in healthy persons, but R. Fleckseder (*Centralblatt f. in. Med.* No. 2, 1905) states that it frequently becomes acid in diabetes mellitus, carcinoma, pernicious anæmia and leukæmia. He states that normal saliva contains traces of ammonia, and he has found urea in the saliva of a uræmic patient who was treated with pilocarpine. The amylolytic ferment shows very little fluctuation in health and disease.

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BILE IN THE URINE.—This occurs in jaundice, and the bile may be detected in the following ways :—

The colour of the urine varies from dark brown to greenish-black, and the presence of the bile pigments, bilirubin and biliverdin, may be ascertained by Gmelin's test. A thin film of the bile-stained urine on a white plate produces, with a drop of nitric acid which contains some nitrous acid, a play

of colours in the following order : green, blue, violet, red, and yellow. In the *München. Med. Woch.* for January there is a new test for bile pigments described by Dr. W. Presslich, and is one which is easily applied as well as exact in its results. About 200 cc. of the urine to be examined are placed in a conical glass, to which 15 drops of fuming nitric acid (nitric with some nitrous acid) are added. In the lower half of the liquid a fine emerald-green colour appears, which is imparted, on its being stirred, to the whole of the fluid. Dr. Presslich found that the chemical process, like that of Gmelin's reaction, is due to oxidation, while the test is said to be a more delicate one than Gmelin's. It must be remembered, however, that the urine of patients taking salol, aspirin, or salicylate of soda gives a light brown colour in the lower part of the test glass on the addition of fuming nitric acid. Bile salts, sodium tamocholate, and sodium glyco-cholate give somewhat indistinctly Pettenkofer's test. The best method is to warm a thin film of the urine containing the bile, together with a little strong cane sugar solution, in a flat white dish, then dip a glass rod into strong sulphuric acid, and draw it across the film. Along the track of the rod there is a purplish line. Hay's test for bile salts in urine is by far the most trustworthy. It is performed as follows :—Place the urine in a specimen glass, and sprinkle a little of the flowers of sulphur on the surface. If this sinks, bile salts are present, for they reduce the surface tension of the urine. If bile salts are absent, then the flowers of sulphur remain floating on the urine.

ERRATUM.—In the April number, under the heading of " The Headaches of Influenza," by an oversight, a prescription was incorrectly given. Quinine Sulphate is obviously incompatible with an alkali like the Aromatic Spirit of Ammonia.
The prescription should have been as follows :—

℞. Antipyrine   -   -   -   - gr. vi.
    Tinct. Quininæ   -   -   -   - ℥ i.
    Spiritus Chloroformi   -   -   - ℳ x.
    Aquæ   -   -   -   -   - ad ℥ i.
Misce. Ft. Mist.

Novelties and Notices.

"PIONEER" MILK SUGAR.

(The "Pioneer" Milk Sugar Co., 24, Minories, London.)

We have received from the above company a sample tin of their milk sugar, which has been prepared without the use of starchy matter of any description. By its means milk, similar in composition to human milk, can easily be obtained at home at a very slight cost. This of course is a great advantage, as it enables fresh milk to be made up daily. It is found that to prepare one quart of humanised milk, about one pint of fresh cow's milk is required; to this is added one pint of water, four tablespoonsful of the milk sugar, and one tablespoonful of separated cream. Thoroughly well stirred and warmed, it is then quite ready for use, but obviously the preparations of milk and water must be modified according to the age of the child. It is certainly better to sweeten cow's milk with milk sugar or lactose, the natural milk sugar, than to use, as is most frequently done, ordinary cane sugar; hence the advantage of this preparation which has recently been placed on the market.

STANDARDIZED GALENICALS.

(Messrs. Evans, Gadd & Co., Limited, Bristol and Exeter.)

Messrs. Evans, Gadd & Co. have sent us the last edition of their price list of drugs and medical requisites, which is prefaced by an introductory essay on standardization of drugs. It deals with the importance of the identification of plants and the assaying of drugs, and points out the great importance of testing drugs, and their subsequent standardization by the physiological method. With this all scientific medical men will agree. We have also received from the above-mentioned firm samples of drugs so tested, the strength of which is as specified in the British Pharmacopœia. We may add that these samples include some of the most commonly used drugs of the B.P. To mention some, we have before us Tinctura Digitalis, Tinctura Cannabis Indica, Extractum Ergotæ Liquidum, and Tinctura Scillæ.

"TABLOID" QUININE, CAMPHOR, AND ACONITE.

(Messrs. Burroughs Wellcome & Co., London.)

Each tabloid, which is quite small, contains quinine bi-sulphate gr. ¼, camphor gr. ¼, tincture of aconite min. ·/. The preparation is a valuable diaphoretic and antipyretic, and may be conveniently used in the treatment of an ordinary cold and in influenza. Bottles may be obtained containing either 25 or 100 of these portable "tabloids."

STYPTOL TABLETS.

(Messrs. Knoll & Co., Ludwigshafen o/Rhine and London.)

Styptol is the phtalic acid cotarnin. It is a valuable uterine hæmostatic, being particularly useful in causes of uterine hæmorrhage, caused by tumours and at the climacterie. The preparation causes no pain nor any unpleasant after-effects. One great advantage of it is its cheapness, 20 tablets, each containing ·05 gram., costing but one shilling. These can, therefore, be readily used in practice amongst the poor.

BIBLIOGRAPHY RELATING TO CHLORIDE OF ETHYL AS A GENERAL ANÆSTHETIC.

(Messrs. Duncan, Flockhart & Co., Edinburgh and London.)

During the last three years Ethyl Chloride, as a general Anæsthetic, has come into frequent use. In this country, in America, and on the Continent much has been written about this Anæsthetic, and, in order to enable the practitioner to easily look up the literature on the subject, Messrs. Duncan, Flockhart & Co. have published a small pamphlet, and we have no doubt that they will send a free copy to any member of the profession who writes to them mentioning this journal.

COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the April Competitions will be announced in the June number.

a.—The Subject of the Essay for May will be
The Treatment of Epilepsy.

b.—Answers to the following questions are invited :—

1. What are the causes of coma ?

2. How may hæmatoporphyrin in the urine be detected ? In what circumstances does it occur?

3. A male, aged 50, labourer, was admitted to hospital. The following history was obtained. His previous history was good, and there was no evidence of syphilis. One year ago he complained of frontal headache, then he had severe pain in the right temporal region, and his right upper lid drooped. In two months he discovered the right side of his face was numbed, his headaches were worse. Later he suddenly lost consciousness, and fell and injured his head. When he recovered, it was discovered that he was blind in the right eye, and he gradually became blind in the left eye.

On admission he was thin and sallow, his memory was bad, his right upper lid was completely dropped, and the right eyeball looked straight, and could not be moved. The left upper lid was weak, movements of the left eyeball were normal, except the eye could not be moved outwards. The pupils were unequal, the right being larger. Both optic discs showed consecutive atrophy. Sense of smell was absent on the right side, the right conjunctiva was insensitive and injected, on the right side of the face sensation was impaired, mastication was difficult, hearing was defective on both sides. The patient could swallow, all four limbs seemed fairly strong. Knee-jerks were normal. No morbid condition was detected in the chest or abdomen. The urine was normal.

Later it was noted that the uvula was deflected to the left, and the right half of the soft palate was paralysed, the teeth became tightly clenched, the elbow and knee-joints flexed and rigid, the legs adducted, and the knee-jerks increased. The patient became semi-comatose, respirations were 42 and noisy. The temperature rose to 102, mucous râles were heard over the chest, the pulse became very weak, coma deepened, and the patient died. What morbid condition was found on post-mortem examination which produced these symptoms?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner " Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of June, 1905. No Essay must contain more than two thousand words, and the Editor reserves the right to publish any Essay which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner " Questions," and must be sent to the Editor on or before the 1st day of June, 1905.

A and B.—(1) One side of the paper only must be written on.

(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

ON BREATHLESSNESS, ESPECIALLY IN RELATION TO CARDIAC DISEASE.[1]

By SIR LAUDER BRUNTON, M.D., F.R.S.,

Consulting Physician to St. Bartholomew's Hospital.

GENTLEMEN,

LET me begin by thanking you and your President for the honour you have done me in asking me to address you. The subject I have chosen for my address is that of breathlessness, and especially breathlessness dependent upon weakness or disease of the heart. I have been induced to select this subject by my recollection of a case which I saw several years ago with Dr. Waterhouse in this district. Moreover, I thought I knew enough about the subject to write a paper about it with ease, and it is only after working at it for several months, reading up the literature in monographs, in four different languages, considering with especial care the work of my friend Professor Angelo Mosso, and discussing respiration in general and breathlessness in particular with my friend Professor Hugo Kronecker, that I find that the subject is one of the most difficult in the whole of physiology or pathology. I must warn you, therefore, that the conclusions at which I have arrived, and which I am now going to put before you, are not to be regarded as an expression of generally accepted facts, but only as the opinions at which I have arrived myself after careful study. Any value they may have depends on their being founded, not on laboratory work alone, nor on clinical work alone, but on both combined. In the case which, as I have just mentioned, I saw, not very far from the place where I am now speaking, that breathlessness was the most prominent symptom, and I diagnosed the patient to be suffering from atheroma of the right coronary artery. To some this diagnosis might seem to be fanciful, but, as I will

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[1] Address delivered at a Meeting of the Willesden and District Medical Society.

presently show, it was almost the only one possible to make, and post-mortem examination proved it to be correct. The patient, Mr. B., was a gentleman of 67 years of age, who had been a good deal in the Colonies. I had seen him several times on his visits home. When he returned finally to this country and came to consult me, I was at once struck by his deep and hurried breathing as he walked towards me from the door of my consulting room. I thought I might find something wrong with his lungs, but on examination I found that they were on the whole healthy, the only abnormal conditions to be noted being that the respiratory sounds were exaggerated over both fronts and backs and there was slight crepitation over the lower part of both backs. There was a diastolic murmur indicating some aortic regurgitation, and a very faint systolic murmur at the apex not propagated to the axilla. There was a slight trace of albumen in the urine, of which the specific gravity was 10·28. The appetite was poor and there was some dyspepsia. On considering the causes to which his shortness of breath might be due, it was easy to eliminate the lungs because they were on the whole healthy, the air passed freely in and out of them, and they were doing more work than usual. Notwithstanding the slight trace of albumen, the condition of the kidneys might be regarded as good, for the specific gravity of the urine was unusually high, so that it was clear they could eliminate a large proportion of solids. Having excluded the lungs and the kidneys as causes of his breathlessness, there remained only the heart. The most likely condition to produce the symptom was general fatty degeneration of this organ, and I expected to find weak sounds and a feeble impulse. To my astonishment, however, the sounds were loud, and the apex beat was not only lower down and further out than usual, but it was strong and heaving, showing that the cardiac enlargement was due to hypertrophy and not merely to dilatation. The pulse was strong and regular, and yet his breathlessness was evidently of cardiac origin. I therefore concluded that although the left ventricle was strong and somewhat hypertrophied, yet the right ventricle was so weak as to be unable to properly perform its work of driving the blood through the lungs. The most likely cause of such weakness is fatty degeneration, consequent upon imperfect supply of blood to the ventricle, and I was therefore

forced to diagnose atheroma of the right coronary artery. At the post-mortem examination we found, as I had diagnosed, atheroma of the right coronary artery, but we did not find it exactly of the kind that I had expected. The left ventricle was large, powerful, and well nourished. It was nearly three-quarters of an inch thick, and the muscular structure seemed quite healthy. The right ventricle, on the contrary, was barely a quarter of an inch thick, and so soft and friable that with a slight push the finger went more readily through it than through a sheet of blotting-paper. I expected to find the atheroma round the mouth of the right coronary artery at the point where it left the aorta, and I was therefore a good deal astonished, when the aorta was opened, to find its interior quite smooth and free from atheroma. On slitting up the coronary artery, however, as it ran along the interventricular groove, we found all the branches passing from it to the right ventricle almost occluded by atheroma.

It seems to me that this case is interesting physiologically, as well as pathologically, for it shows very clearly the part played by the heart in the function of respiration. In order to have the blood aërated we require (1st) that fresh air shall freely enter the lungs so as to aërate the blood, and (2nd) that the blood shall flow readily through the lungs, so as to be exposed in sufficient quantity to the air, before it enters the general circulation and goes to aërate the tissues. By stopping either process asphyxia may be produced. By interfering with either process breathlessness may be produced.

I have here used the word breathlessness purposely because its meaning is somewhat vague, and it may be used in two different senses, between which I wish now to differentiate. It is sometimes used to signify increased breathing, and at other times distressed or painful breathing. These conditions are so nearly allied that the first, or increased breathing, readily passes into the second, or painful breathing, and yet the two are essentially distinct. The first, increased breathing, is sometimes called *polypnœa*, because the respirations, as a rule, are quicker as well as deeper ; but I think a better term is *hyperpnœa*, because this term signifies increased breathing without taking into consideration whether the respirations are more numerous or simply deeper. A short time ago, on the beach at Margate, I saw a little girl playing at ball. As she

ran hither and thither over the sand, her long hair streaming
out behind her, her cheeks glowing, and her eyes gleaming,
her respirations were both rapid and deep. But there was no
trace of distress in the child's breathing. She had hyperpnœa,
but it was *eupnœa*, or pleasant breathing, not *dyspnœa*, or
painful breathing, for the expression of her face, her gestures,
and the cries she uttered from time to time were all indicative
of perfect delight and of the full enjoyment of health and well-
being. One could see that the respirations were both rapid
and deep, and if I had been able to feel her heart I have no
doubt I should have found it beating quickly and strongly ; but
although both heart and lungs were acting more than usual
they were not acting beyond the bounds of health, and their
movements were in perfect co-ordination with each other and
with the muscular efforts which the child was making. She
was enjoying herself to the utmost, and there was no trace
whatever of the distress to which we give the name of
dyspnœa. Although her respiratory apparatus was acting
excessively, the child was quite unconscious of the fact, and
the unusually great action of the heart and lungs was only
associated in her mind with an unusual sense of pleasure and
well-being. It is when the heart and lungs fail to aërate the
blood sufficiently, in spite of all their efforts, that the person
becomes conscious of painful breathing or dyspnœa.

Such imperfect aëration as leads to dyspnœa may occur
either (*a*) from the air being hindered in its free passage to and
from the lungs, or (*b*) from the blood being hindered in its free
circulation through the lungs. Both these factors may act
conjointly and probably very often do. Indeed interference
with the passage of air into or from the lungs appears to have
stagnation of blood in the pulmonary vessels as a consequence,
for in those cases of asphyxia where death is not due to shock,
the lungs are engorged and the right side of the heart distended.
A similar condition appears to occur in life during dyspnœa, as
I think an observation I once made upon myself appears to
show. When crossing the Theodule Pass, in Switzerland, in
1878, my guides began to walk rather quickly. I had thrown
off my coat, and my shirt was open at the breast, so that I was
able to feel the heart without any trouble. With the increased
pace I began to feel a sense of distress and oppression at the

chest. On putting my hand over the spot where the apex beat ought to have been, I was astonished to find that it had disappeared and that marked epigastric pulsation had taken its place. I called to the guides to walk more slowly, and putting my hand upon my breast I found that as the distress diminished the epigastric pulsation disappeared, and I could again feel the apex beat in its normal situation. It is evident from this observation that during the extra exertion the right side of my heart had been unable to send on the blood through the lungs as quickly as it was received from the veins, and that consequently the right ventricle had become dilated (*cf.* Fig. 4, p. 747). This experience has led me to think that the sensation of dyspnœa is probably of cardiac rather than pulmonary origin, and I think it is only when the right heart begins to fail to empty itself that the feeling of dyspnœa comes on. The forced respirations by which one tries to relieve it are I think beneficial, not merely by bringing more air into the lungs, but by a kind of mechanical massage to the heart, as was shown years ago by my friend Professor Hugo Kronecker,[1] and illustrated in the accompanying diagrams (Figs. 1 and 2). It is quite extraordinary how many

Fig. 1. *Diagram of a transverse section of the thorax during inspiration and cardiac systole. It shows the tendency to the formation of a vacuum in the pleural and pericardial cavities into which lymph flows. Air is also drawn into the lungs, and blood is sucked into the auricles from the abdominal veins.*

instances are on record of men and animals having fallen dead, not during the period of violent exertion, but just when it was

[1] Kronecker and Heinriclus : *Abhandlungen der Königl. Sachsischen Gesell. d. Wiss.*, 1888, Bd. XIV., p. 427

over. A short time ago I was at Fribourg, in Switzerland, and saw a huge linden tree, which is said to have grown from the twig which the messenger held in his hand when he brought to his fellow citizens the news of their victory over Charles the
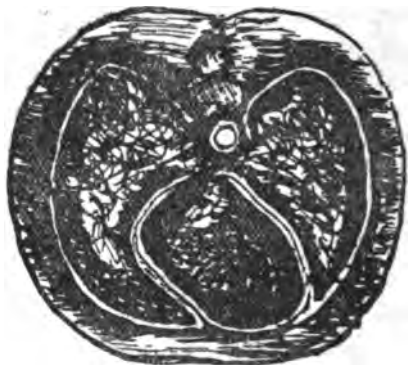
Fig. 2. Diagram of a transverse section of the chest during expiration and cardiac diastole, showing the pressure of the walls of the pleural and pericardial cavities against each other, so that lymph is pressed out into the lymphatics.

Bold at Morat. He had run all the way from the battlefield to the town, and was only able to cry " Victory ! " when he fell dead. There are many other examples of the same sort, but the best known is that of the Greek who brought to Athens the news of the victory at Marathon, and who fell dead as soon as he had delivered his message. There are numerous accounts also of horses falling dead at the foot of the scaffold after having been ridden hard to bring a reprieve to a condemned criminal. At one time I used to think how fortunate it was that the horses had lasted so long as to reach the scaffold, but now I think that if the reprieve had simply been handed to an official and the horses had not been pulled up quickly, but simply allowed to slacken their speed, they would not have died at all.

Once I nearly lost a train and was obliged to rush up a long flight of steps at the station as quickly as I could with a portmanteau in my hand. I just got into the carriage as the train began to move, and the sensation of dyspnœa that I then had was most distressing, so that I put my head out of the window and took long deep breaths in order to relieve it. It was

during this experience that I began to feel that if, instead of having been obliged to remain quietly in the train after my violent exertion, I had been able to run a little further and slow my pace gradually I should not have had anything like the same distress.

In dyspnœa we must remember that there are two conditions, the subjective and the objective one. In my own case, when I entered the railway carriage there was the subjective sensation of distress and suffocation which I felt, and there was the panting-breathing which my fellow-passengers could observe as well as myself. In considering the subject of dyspnœa we must carefully distinguish between these two conditions, the subjective sensations and the objective phenomena, and we must carefully bear in mind that the relationship of these two factors may vary very considerably.

The causation of breathlessness is very complicated, and at the same time it is most important that it should be thoroughly understood. I think it may, therefore, be worth while to illustrate it by a reference to fatigue in which, as well as in breathlessness and pain, we have a subjective and objective part.

The objective part has been carefully studied in an isolated muscle taken from a frog's leg. When this is kept contracting for a length of time by electrical stimulation the contractions become gradually smaller and feebler, and at length cease entirely, however great the stimulus may be. At first sight it might be supposed that this exhaustion of the muscle is merely due to the force-giving substances it contains being used up, just as a locomotive will cease running when its supply of coal becomes exhausted. But this is only partially the case. The exhaustion is chiefly due to the accumulation of waste products in the muscle which paralyse it, just as an accumulation of ash in the furnace of a locomotive would choke it up and prevent its action. When these waste products are removed by massage of the muscles, or still more efficiently by washing them out by means of artificial circulation, the paralysis disappears, and contractility returns. Such is, broadly sketched, the process of muscular exhaustion in the muscles.

We have now to consider the sensation of fatigue which

is a function of the central nervous system. Like pain, it is a danger-signal. Its object is to give due warning of the condition of the muscles so as to save them from being exhausted, and it comes on, as a rule, long before exhaustion occurs. Like pain, it usually has a peripheral origin ; but, like pain, it may be entirely central, and just as excessive pain may be felt by an hysterical woman in a perfectly healthy knee-joint, so excessive fatigue may be felt in the limbs, although the muscles themselves are perfectly healthy and capable of a great amount of exertion. " Constitutionally tired," or, as their friends term them, " lazy " people, are even more common than hysterical people ; but a sudden powerful mental stimulus will generally waken lazy people up, and enable them to undergo such exertions as to astonish those who have only known them under ordinary conditions. The same thing occurs even when the muscles are really in a condition of considerable exhaustion. Troops on the march, apparently exhausted and hardly able to drag one foot after the other, will sometimes pull themselves together, and step out as briskly as if they were completely fresh, when they learn that the enemy is near, and there is a prospect of an immediate engagement.

The sensation of fatigue may also be removed by certain drugs which act upon the nervous system. The best known of these is, perhaps, cocaine. The coca leaves have been long used by the natives of Peru to prevent fatigue when making long journeys on foot. Tea, coffee, beef-tea and tobacco have a similar power of lessening fatigue, though perhaps not to the same extent, and so has alcohol, though its effects are only temporary, and are usually succeeded by greater exhaustion. It is possible that these drugs may have a slight effect upon the muscles, but such effect is small compared with the action they exert upon the central nervous system.

As I wish to have the ground thoroughly cleared for the consideration of dyspnœa, I trust you will excuse me if I again recapitulate what I have said in regard to fatigue. There are two distinct conditions in fatigue : one is exhaustion of the muscles themselves, and the other is a sensation of fatigue in the central nervous system. The sensation of fatigue can be removed by acting either peripherally on the muscles or

centrally on the brain. By proper massage of the muscles the waste products in them can be removed, their contractility restored, and, the peripheral cause of fatigue being gone, the sensation of fatigue usually ceases. But the sensation of fatigue, which is felt in the brain, can be removed by lessening the excitability of the sensory nerve-centre to peripheral stimuli, either by the use of drugs or by mental excitement, even though the muscles remain fatigued. Now dyspnœa, like pain and like fatigue, consists of two parts, the peripheral condition and the central sensations, and although they generally bear a definite relationship to one another, they do not always do so. Just as a lazy man may feel tired, although examination of his muscles cannot show the least defect in them, and as an hysterical woman may feel pain in her joints although they are perfectly sound, so a person may feel considerable dyspnœa, although no objective cause can be discovered. Thus one sometimes sees a lady, when sitting quietly in a room, suddenly complain of shortness of breath and a feeling of stifling, and insist upon the window being opened, sometimes to the great annoyance of her neighbours, when to the senses of everybody else the room appears to be perfectly ventilated. In such a case there may be some alteration in the action of the heart, and in the pulmonary circulation, which initiate the feeling of suffocation, but yet this feeling is chiefly of central origin, and is out of proportion to the peripheral condition. Sometimes, on the other hand, you may see patients who have marked hyperpnœa from organic disease, and who yet appear to be unconscious of the fact, but in such cases a very little exertion is usually sufficient to bring on distress and give rise to dyspnœa. In some instances we find the patients make no complaint of dyspnœa, even though lividity of the lips and lobes of the ears plainly shows that the blood is insufficiently aërated. In such instances, as well as in that of the lady craving for fresh air, we have a want of relationship between the peripheral condition and the central sensation, but they are of different kinds in the two cases, there being in the cardiac patient an *anesthesia*, and in the nervous lady a *hyperæsthesia* of the cerebral centre for respiratory sensations, wherever that centre may be. Perhaps some of you may

think I have dwelt upon this point at too great length, but I am anxious to emphasise it, because it has an important bearing on treatment, inasmuch as we have sometimes to direct our attention chiefly to the peripheral, and at others to the central condition.

Here again, I must draw attention to a possible mistake in the meaning of the word "central," because it may include both the medulla oblongata and the cerebrum as distinguished from the lungs and heart. It is in the cerebrum alone that sensation is perceived, while the medulla, lungs, and heart will maintain the circulation and respiration after the cerebrum has been completely removed. The popular expression of "bellows" in regard to the breathing apparatus is very descriptive, because air is alternately sucked into the chest and expelled from it by the thoracic walls and diaphragm in much the same way as in a pair of bellows. The muscular movements which effect this receive their innervation from the respiratory centre in the medulla oblongata, or more properly from the respiratory centres, because there is both an inspiratory and an expiratory one. The inspiratory one is in constant action, the expiratory one being usually passive,[1] but the expiratory centre is also called into play when any extra demand is made upon the respiration. The action of the respiratory centre is of a so-called automatic character, *i.e.*, the action depends upon changes in the nerve cells which form the centre, changes which are independent of circulation and reflex action, but are largely influenced by the condition of the blood flowing through the centre, so that, according to Fredericq, when the blood is very venous[2] the centre is excited, and, when the blood is well aërated, the irritability of the centre is diminished. The rhythm of the respiratory movements is, however, regulated almost entirely by reflex impressions passing to the centre through the vagus nerve from the lungs and heart, and through the trigeminus from the upper respiratory passages, though the posterior corpora quadrigemina have

[1] Marckwald: *The Movements of Respiration.* 1888, London: Blackie, pp. 60 and 117.

[2] I have preferred the word venous in order to avoid discussion of the question how far the stimulating power of such blood over the respiratory centre depends on absence of oxygen, or presence of carbonic acid, or presence of other substances.

also a regulating power and can replace the action of the vagi when these are divided.[1] It is probable that both the respiratory stimuli, which act centrally on the nervous system, and those which act peripherally on the lungs and heart, are chemical rather than mechanical, and that they consist of substances whose stimulating action is diminished or destroyed whenever they are fully oxidised. When these substances are produced too quickly or in circumstances which lessen their oxidation, we get hyperpnœa or dyspnœa according to the quantity of the stimulant present. A little extraordinary exertion appears to produce them more quickly than they can be destroyed, so that a person who has run upstairs may palpitate and pant for several minutes after the exertion has ceased. When the oxidising power of the blood is diminished, as in anæmia, less exertion is sufficient to produce the panting, and it is apt to last longer after it has been produced. We do not at present know exactly what these stimulating substances are, nor where they are all produced, but many of them are probably produced in the muscles, for Kronecker found that, if one muscle be tetanized, the whole body may be paralysed by its waste products, and Mosso found that the blood of fatigued animals, when injected into healthy animals, caused the heart to beat more quickly and the respiration to become accelerated.[2] It is hardly necessary for us to consider the mechanical causes of dyspnœa, such as lessening of the calibre

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[1] Marckwald: *Zeitsch. f. Biologie,* Bd. XXVI., N.F. VIII., p. 285. Marckwald, using Kronecker's method of rendering various parts of the brain inactive by plugging the arteries supplying them with paraffin injections, came to the following conclusions:—Neither the cerebrum nor the anterior part of the middle brain has a constant influence over respiration. On the other hand, if the two posterior corpora quadrigemina are paralysed, respiration changes at once, and does not regain its normal character; the long, deep, and quite regular respiratory convulsions occur, which gradually become shorter, and their depth, remaining the same, becomes regular and rhythmic. This alteration of the irregular convulsions is due to the sensory nucleus of the trigeminus. So long as this is active, the respiratory convulsions remain regular; so soon as it is paralysed, they become irregular, their stimuli proceed from the quadrigemina and from the sensory nucleus of the trigeminus which regulates the breathing after the vagi are paralysed. The posterior corpora quadrigemina have a natural tonic action, and can replace that of the vagi when these nerves are cut, while the vagi, on the other hand, can replace the removal of the corpora quadrigemina. After the removal of the posterior corpora quadrigemina the trigeminus nucleus adopts a tonic action.

[2] Mosso: *Die Ermüdung,* Leipzig, 1892, p. 119.

of the larynx by diphtheritic membrane, or diminution of lung space by hydrothorax, pneumothorax, empyema, pneumonia, bronchitis, or phthisis, as the diminution in the breathing space produces its effects in such an obvious manner. The pathology of spasmodic asthma is, however, by no means settled. It is quite certain that in an attack expiration is prolonged, a condition which would appear to indicate a diminution in the elasticity and contractile power of the lungs. This is also the case in breathlessness after exertion, as I have myself noticed. In asthma this condition may be due, in part at least, to a nervous affection of the contractile tissue in the lungs themselves, because that they are actively contractile was shown by Traube,[1] Ludwig and E. E. Müller,[2] and confirmed by Fano and Fasola.[3] But it seems not improbable that another factor may be present, namely, distension of the pulmonary capillaries. So far as I know, the effect of distension of the pulmonary capillaries in dilating the air vesicles was first noticed by Hales,[4] and was insisted on by Dr. Hensley in his Goulstonian Lectures delivered before the Royal College of Physicians in 1872. He pointed out that the network of capillaries, surrounding each pulmonary alveolus, tends, when distended with blood, to pull the walls of the alveolus apart, and thus to increase the size of the lung. The truth of Dr. Hensley's statement was experimentally proved by a German observer who imitated the conditions in the alveoli of the lung by a network of elastic tubes arranged round a bladder. The importance of this condition of lung stiffness as a cause of dyspnœa has been greatly insisted upon by Prof. von Basch,[5] but why the blood should distend the pulmonary capillaries to such an extent, as to make them more or less rigid instead of flowing easily and quietly through them, is a question which is not easy to answer.

In a paper, read before the British Association in Bradford, September 1873,[6] I mentioned that muscarine appeared to have the power of contracting the pulmonary capillaries and

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[1] Traube : Quoted by Ludwig.

[2] Ludwig's *Arbeiten* for 1869, p. 38.

[3] Fano and Fasola : *Archivio per le scienze mediche*, Vol. XVII., pp. 453 and 454.

[4] Hales : *Statical Essays*, London, 1733, Vol. II., p. 77.

[5] Von Basch: *Allgemeine Physiologie u. Pathologie d. Kreislaufs*, p. 74.

[6] Brunton: *Reports of the British Association for* 1873.

preventing the passage of blood through them, so that, under its influence, the lungs became blanched and the right side of the heart distended.

Fig. 3. *Diagram of the normal pulmonary circulation.*   Fig 4. *Diagram of the pulmonary circulation in poisoning by muscarine.*
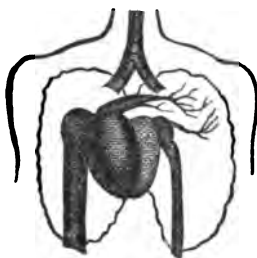
This effect could be immediately removed by atropine, which caused the lungs to become rosy and the right side of the heart to return to its normal condition. I attributed this to the effect of the contracting action of muscarine upon the pulmonary capillaries, an action which was antagonised by the atropine. This conclusion has been controverted by others, who have regarded this result as due to the effect of muscarine and atropine upon the heart rather than upon the pulmonary capillaries. I am still, however, inclined to believe that my opinion is correct, and that, in my experiments with muscarine, one simply had an exaggerated example of what occurs constantly during dyspnœa, where an action similar to that of muscarine is produced by the waste products contained in the venous blood. It is certain that muscarine produces great dyspnœa,[1] and that this dyspnœa can be immediately and certainly removed by atropine.[2] The cause of this action Schmiedeberg and Koppe were unable to explain.[3] Whether the explanation I have given is correct or not, it is clear that the condition of the right heart is the same in poisoning by muscarine and in great dyspnœa.

The passage of blood through the capillaries of the lung is evidently one in which the conditions differ considerably from other parts of the body, for in experiments on artificial

[1] Schmiedeberg and Koppe: *Das Muscarin,* Leipzig, Vogel, 1869, p. 22.
[2] Schmiedeberg and Koppe, *Op. cit.,* p. 55.
[3] *Op. cit.,* p. 55.

circulation through excised organs, such as the muscle or liver, one finds that venous blood passes rapidly through the vessels, whereas arterial blood passes slowly. As Ludwig once said to me, the organs seem to be able to regulate the supply of oxygenated blood to the tissues of which they are composed, so as not to allow combustion to go on too rapidly. But in the lungs we have completely venous blood, at the beginning of the capillary circulation, nearest to the right ventricle, and at the other end, near the left auricle, we have arterial blood. This introduces a factor of complexity which we have not in any other organ, and, whatever the cause may be, I think we may say positively that, in dyspnœa, there is a tendency to diminished pulmonary circulation, and to distension of the right side of the heart. When dyspnœa is excessive, the patient is unable to lie down, and we get the condition known as orthopnœa. Some years ago I wrote a paper in which I considered that this position was adopted by patients because in it the contraction of the diaphragm only moved the abdominal contents outwards, whereas in the recumbent position it moved them upwards.[1] I think
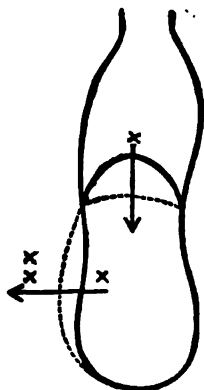
Fig. 5. *Diagram of thorax and abdomen in the upright position. The arrows show the direction in which the diaphragm and abdominal viscera move.*

that there is a certain amount of truth in this explanation, but I am convinced that it is not the whole truth, for, in going through a hospital ward, one may see patients with pneumonia,

[1] *Lancet*, July 2, 1892.

bronchitis, or phthisis, all lying down with their heads low, but those who are propped up in bed are almost always suffering from cardiac disease, and even where the primary illness is bronchitis, it is secondary cardiac dilatation which produces
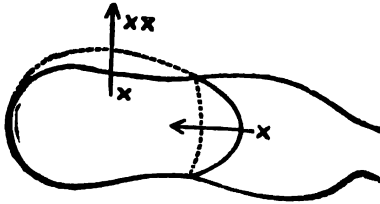
Fig. 6. *Diagram of trunk in recumbent position. The arrows show that the diaphragm moves horizontally, and lifts the viscera vertically.*

the orthopnœa. To the best of my knowledge, it was Mr. Leonard Hill, who pointed out that the relief, which the upright position afforded in such cases, was due to lessened pressure of the blood inside the right heart. One of the good old remedies, now out of fashion, for cardiac dyspnœa is blood-letting, and when I was house physician to the late Professor Hughes Bennett, I had very frequently to employ it under his direction to the great advantage of his patients. The frequency, with which he ordered it in cases of distended right heart, was all the more striking because he prided himself upon having been the man who had abolished its use in pneumonia. In many cases under his care small bleedings of 10 or 12 ozs. greatly relieved the dyspnœa in congestion of the right side of the heart, whether it was due to mitral regurgitation, or mitral obstruction, or was consequent upon chronic bronchitis. The three diseases, which I have mentioned, are the most common causes of right-sided congestion and dyspnœa. I have seen high tension in the arterial system classified in a book as a cause of cardiac dyspnœa, but I think it is incorrectly so classified, for high tension in the arteries cannot affect the lungs, so long as the aortic and mitral valves are sound. It is evident that, during the diastole, the high arterial tension can have no effect whatever upon the heart, because the column of blood in the aorta and arterial system generally is shut off completely from the heart by the closed aortic valves (Fig. 7). During the systole, when the aortic valves are open, the high tension of the blood in

the arteries presses also upon the interior of the left ventricle, but so long as the mitral valves are competent, the left auricle and lungs remain unaffected (Fig. 8). Even when the aortic
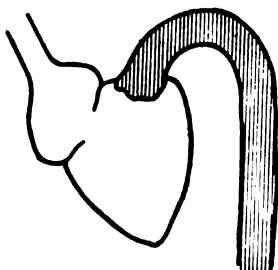
Fig. 7. *Diagram of healthy heart in diastole. The aorta is full of blood under pressure, as indicated by the shading, but the ventricle and auricle are protected from pressure by the sigmoid valves.*

valves become incompetent, the lungs remain very slightly affected, if they are affected at all, and in many cases of well-marked aortic regurgitation we find no shortness of breath, and still less do we find any dyspnœa (Fig. 8). The patients may, indeed, be absolutely unconscious that there is anything
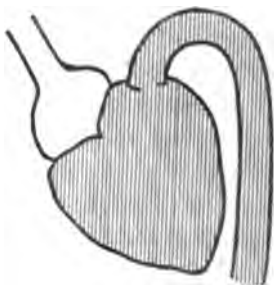
Fig. 8. *Diagram of a heart with incompetent aortic valves. The ventricle, as well as the aorta, is under pressure during diastole, but the auricle is protected by the auriculo-ventricular valves.*

the matter with them. It is when the mitral valves become affected, either by vegetations or puckering, which render them incapable of shutting completely, or in consequence of the auriculo-ventricular orifice becoming so dilated that the valves, however healthy they may be, are unable to close it, that the blood is thrown back upon the pulmonary veins at each contraction of the left (Fig. 9) ventricle, and its onward flow is thus

hindered, and dyspnœa occurs. Still worse is it when the mitral orifice is narrowed, because then, in place of the obstruc-
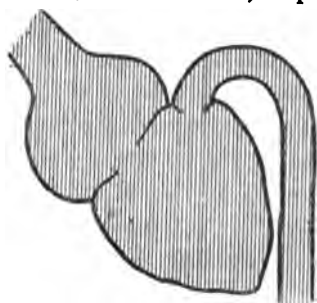
Fig. 9. *Diagram of a heart with incompetent aortic and mitral valves. The auricle and veins, as well as the ventricle and aorta, are under pressure constantly.*

tion being intermittent, it becomes constant, and the vessels, which will stand an intermittent strain, yield to one which is continuous.

In the early experiments made by my dear old master, Professor Ludwig, on artificial circulation through isolated parts of the body, he used blood under constant pressure.[1] He found, however, that the pressure, which had at first been sufficient to send the blood readily through the vessels of an excised organ, became insufficient to do so as the experiments went on, and it became necessary to raise it constantly. At the same time the tissues continued to undergo œdematous infiltration, and with some organs, such as the kidney, it was impossible to maintain functional activity. After a while, however, he discovered that if the pressure was rhythmically increased and lessened by raising and lowering the vessel containing the blood, at such a rate and through such a height as to imitate the natural rise and fall in the arterial pressure, which the beats of the heart caused, circulation went on for a long time without any increase in pressure being requisite, and without the appearance of œdema.[2]

The different effects on the respiration of distension of the right and left ventricles are well shown by some experiments of Kauders, who found, under von Basch's direction, that, when an indiarubber bag was introduced into the *left* ventricle and

[1] Ludwig's *Arbeiten* for 1868, p. 14.
[2] He did this about 1870, when I was working in his laboratory.

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blown up so as to prevent the blood from issuing from the ung, the blood pressure in the aorta sank, the thorax became distended and moved violently, the diaphragm sank and also moved violently, so that the whole thorax was *dilated,* and respiratory movements increased. This was not due to the vagi, because the same occurrence took place when they were divided. When the *right* ventricle was obstructed in the same manner, and blood was thus prevented from entering the lungs, exactly the opposite effect on the respiration took place, the blood pressure sank, the thorax fell in, and the diaphragm rose up, so that the size of the thorax became much *diminished.* Excursions of the diaphragm, however, remained well marked.

In cases of aortic regurgitation, where, as I have already said, one frequently finds no dyspnœa, the left auricle probably plays a great part in protecting the pulmonary veins from reflex pressure. But the ventricles and auricles are not the only structures connected with the heart which have the power ot rhythmical contraction. Some years ago, Sir Joseph Fayrer and I noticed that both the pulmonary veins and the vena cava possess the power of rhythmical contraction, and may continue to pulsate even when both auricles and ventricles are standing quite still.[1] This fact was known to Haller,[2] Senac,[3] and Johannes Müller,[4] and its importance in preventing backward flow into the veins recognised, but it had been forgotten, and was not to be found in recent books on Physiology until it was rediscovered by Fayrer and myself.

The great object we have in view in attempting to lessen cardiac dyspnœa is to facilitate the pulmonary circulation, and we will now discuss the various means at our disposal for this purpose.

The first and most efficient of all is absolute rest.

Even in healthy persons the movements of the muscles tend to raise arterial tension and to accelerate the breathing, and, if they be carried to any great extent, will cause dyspnœa. The amount of movement necessary to produce these effects

[1] Brunton and Fayrer: *Proc. Roy. Soc.,* 1874, Vol. XXII., p. 125, and *Proc. Roy. Soc.,* 1876, No. 172, p. .

[2] Haller: *Elementa Physiologia,* 1757, Tom. I., pp. 399 and 410, and *Mémoires sur la Nature sensible et irritable des parties du corps animal,* 1756, Tom. IV., p. 4.

[3] Senac: *Traité de la structure du Cœur,* Paris, 1783, Tom. II., p. 37.

[4] Müller's *Physiology,* translated by Baley, 2nd ed., Vol. I., p. 182.

becomes less and less as the heart fails, and at last a very slight movement indeed is sufficient to give the patient respiratory distress, as much as what would occur in healthy persons after very violent exertion. It is sometimes very difficult to make patients understand what one means by absolute rest, and unless one is careful to explain that you mean them to stay in bed, or in a chair, without moving from it *for any purpose whatever*, they will as likely as not get out of bed, and walk about the room, or even from one room to another. The rule that I lay down to my patients is : " Do absolutely nothing that any one else can do for you." If he wishes to be raised in bed, or to have the clothes adjusted, he must ask the nurse to do it for him, and more especially is it necessary to insist that the patient shall not get up to pass water or empty the bowels, but should use a urinal or bed-pan. Some patients are, however, unable to use a bed-pan, and insist upon getting up to relieve the bowels. In such cases I recommend that a stand should be made for the commode that should bring it to such a height that the patient can be moved on to it and back from it without the level of the pelvis being altered. The nature of the bed is of considerable importance, because a feather bed does not give sufficient support, and the patient can be moved much more easily. on a hair mattress. In cases where the patient is absolutely unable to remain in bed, and must sit up, the same conditions must be carried out as far as possible, namely, that he must not take a single beat out of his heart that can possibly be avoided.

The next agency which is useful is massage. Ordinarily the heart has to keep up the circulation, that is, to drive the blood round through the arteries to the extremities and back again through the veins, but it is obvious that, if the masseur's hand can return the blood from the extremities through the veins, it will act the part of an assistant to the heart, and take a certain amount of work away from it. When actual dyspnœa is present, movements, however slight, are to be avoided, but when the heart is beginning to recover, and the patient is able for it, graduated movements and the Nauheim baths are most useful in aiding recovery.

Amongst drugs, the most important in its action upon the heart is digitalis, and perhaps there is no better way of giving it

than the old-fashioned pill, which contains 1 gr. digitalis, 1 gr.
squill, and 1 gr. blue pill. This is the most common formula,
but occasionally an additional grain of blue pill is added to it,
and sometimes, as in St. Bartholomew's Hospital, some extract
of hyoscyamus, where we use 2 grs. in each pill. Why the
blue pill should help the action of the digitalis one cannot tell,
but I think there can be no doubt whatever that it does so.
Notwithstanding all the work that has been done upon the
chemistry and pharmacology of digitalis, our knowledge of it
is still imperfect, and I can only suspect that the different
methods, in which it is used in Edinburgh and London, depend
upon a different composition of the plants grown in Scotland
and England. In London I believe the preparation most
frequently employed is the tincture, while in Edinburgh the
infusion used almost invariably to be given. When I was
house physician in Edinburgh, the infusion was almost in-
variably given in half-ounce doses, but when I have prescribed
the infusion for patients in London I have found this dose
rather large, and it seemed to me more apt to produce sickness
than the Scotch preparation, so that I have more commonly
given it in doses of one to two drachms rather than in doses of
half an ounce. I confess that I have been more inclined to use
the tincture or infusion than digitaline, but nevertheless I have
found Nativell's digitaline in half milligramme to milligramme
doses act well. In some patients where digitalis does not
succeed, strophanthus proves efficient and *vice versâ*, but I do
not think one can tell beforehand which these cases are, and it
is only by trial that one can find it out. One of the most
valuable remedies for strengthening the heart is strychnine.
Its action appears to be that of stimulating the cardiac ganglia,
and in cases, where one is doubtful about giving digitalis or
strophanthus, either because of their power of slowing the
heart or of unduly raising the tension, one has recourse to
strychnine. At the same time it proves a most useful adjunct
both to digitalis and strophanthus, and may be given either by
the mouth or subcutaneously.

Where the heart is failing, digitaline and strychnine may be
employed subcutaneously together, and one half, even one
milligramme of the former with a twentieth or even a tenth
of a grain of the latter. I remember well being asked by a

practitioner, whom I met in consultation, how often I should use it in the case of an old lady with pneumonia whose heart was failing, and I said he should give the strychnine in her case until he saw the fingers jump. He followed my advice with the result that the old lady got through. Another useful remedy in dyspnœa, both of cardiac and pulmonary origin, is oxygen. I may be wrong in doing so, but I take some credit to myself for bringing both oxygen and strychnine into general use in this country. In the *Medical Record* of 1874, p. 293, I abstracted a paper on the action of strychnine on the respiratory centres, and, in a conjoint paper with Professor Cash,[1] I showed its powerful action as a cardiac stimulant. In my lectures on therapeutics for thirty years, I have insisted upon these facts. Oxygen was largely used more than a hundred years ago. Its use had fallen into abeyance except in cases of poisoning by coal gas, and it was but little used until a joint paper by Dr. Prickett and myself on its use in pneumonia[2] again brought it into prominence. In year books of medicine before this, I can find very few notes about its use, but, immediately after this paper, letters regarding it were frequent, and its use became general. Citrate of caffeine in doses of 2 to 5 grs., or diuretin in doses of 2 to 10 grs., every six hours, are sometimes useful adjuncts to digitalis or strophanthus. Sometimes these drugs cause irritation of the stomach or bowels, and give rise to sickness or diarrhœa which may require their discontinuance, and, as a rule, I think they do more good, if used only for a week or even less, and an interval of some days is allowed before they are given again. One of the most important means of relieving dyspnœa is certainly, I think, free purgation, and one of the best means of securing it, is by the use of compound jalap powder in doses of 20 to 60 grs. This combined with the digitalis and blue pill, already mentioned, increases the elimination of water both by the bowel and by the kidney, and lessens the congestion of the liver, which is the natural consequence of venous stagnation. It also relieves the tendency to an œdematous condition of the lung and eases the respiration. When much exudation occurs

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[1] Brunton and Cash: " On the Explanation of Stannius's Experiments and on the Action of Strychnine on the Frog's Heart," *St. Bartholomew's Hospital Reports*, Vol. XVI., p. 229.

[2] Brunton and Prickett: *Brit. Med. Journ.*, January 23, 1892.

either into the peritoneum, or into the pleural cavities, it must of course be relieved by tapping, and sometimes the relief of dyspnœa by tapping the legs is very great. The best way of doing this depends a great deal upon the patient. Sometimes I have used with great satisfaction Southey's or Bartel's tubes, but in other cases I have found simple puncture by needles, or small incisions with plenty of absorbent wool more satisfactory. Last but not least I wish to emphasise the use of opium. For some reason or another there is quite an unnecessary fear both of this drug and of mercury, and I have seen doctors who were afraid to give mercury or calomel in a case of heart disease because there was albumen in the urine. It was with reference to the use of opium that I tried to emphasise so much the distinction between the peripheral cause and the cerebral sensation of dyspnœa. In many cases of cardiac disease the patient is prevented from falling asleep by a sudden start or a suffocative feeling, and his condition is rendered materially worse by the exhaustion consequent upon want of sleep. In cardiac dyspnœa there is no drug which will give such immediate relief as opium, and it may be administered either by the mouth, or as a subcutaneous injection of morphine, or in a way which I have not seen described, and which I think is sometimes a very satisfactory way of giving opium, viz., by mixing from half a drachm to a drachm of the tincture, not with one or two ounces of water as is usually done, but only up to two drachms with water, and injecting this amount into the rectum with an ordinary glycerine syringe. In the awful dyspnœa of renal disease there is no drug which will give relief to the same extent as opium, and these are just the cases in which the prejudice against opium, which I have already mentioned, leads men to withhold the drug. I do not know that I should have insisted upon this point, were it not that I have seen cases in which I thought that the fear of opium had led the practitioner to withhold it, as he thought, for the patient's safety, but as I believe it, to the patient's detriment.

One other point of great practical importance I must not omit, viz., the effect of distension of the stomach by flatulence or even by food, or distension of the peritoneal cavity by ascites. All these conditions tend to tilt the heart up and embarrass its action, to say nothing of their interference

with the expansion of the lungs (Fig. 10). Food must be chosen which will not cause flatulence, and this is one advantage, though by no means the only one, of a milk diet. Carminatives
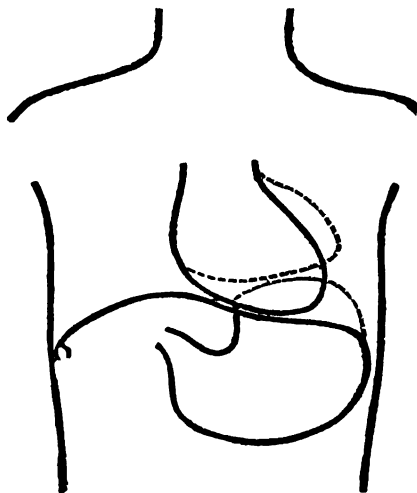
Fig. 10. *Diagram to illustrate the effect of distension of the stomach on the heart. The dark lines show the natural position of the organs. The dotted lines indicate their position when the stomach is distended.*

must be used to bring the wind away when it is present, and the relief they give is sometimes wonderful and almost instantaneous.

In order to complete this paper I ought perhaps to have discussed the action of nitrate of amyl and other vaso-dilators ; but this address is already too long, and, in conclusion, gentlemen, I have to thank you for the patience with which you have listened to it, and for the honour you have done me in asking me to give it.

coronary arteries were slightly atheromatous. The right pleura contained 4 ozs. of clear fluid, and the left 6 ozs.; the lungs were œdematous. The peritoneal cavity contained 15½ pints of ascitic fluid, sp. gr. 1016, albumen 1·5 per cent.; under the microscope a few leucocytes, but no pus corpuscles were seen. The peritoneum was pale, and looked thicker than normal; there were no peritoneal adhesions. The veins in the lower half of the œsophagus were dilated, and one had ruptured about 4 inches from the cardiac opening. The stomach contained a large quantity of blood and the veins in the walls were greatly distended, the mucous membrane being deeply stained with blood at the cardiac end; there was general catarrh of the mucous membrane.

The small and large intestines contained a large amount of altered blood, and showed general catarrh. The liver weighed 59 ozs.; it was a most markedly hobnail liver, looked small and greatly contracted, with large and small nodules. There was marked thickening of Glisson's capsule, but no lymph over the surface. The kidneys were large and equal in size, right 9 ozs., left 8½ ozs.; the capsules stripped easily; the cortices were broader than normal, and pale; the medullary portions were also pale. Under the microscope the renal epithelium was greatly swollen in parts; the nuclei were indistinct, and there was marked fatty degeneration. The Malpighian tufts were slightly swollen, the arteries thickened, and there was some interstitial change. The spleen weighed 12 oz., it was very pale and the capsule thickened; its substance was firm.

The case just related, which was watched by some of you, serves as an introduction to a few general remarks upon this disease.

The history may be said to be fairly typical, for although in the post-mortem room cirrhotic livers are met with from many sources of origin, and while it may be admitted that interstitial hepatitis may arise from any infective toxin or from other substances besides alcohol taken as food, the chief and nearly invariable cause of the condition, as we recognise it clinically, is the excessive use of alcoholic drinks. It has been suggested by some writers that the true cause is not the alcohol but some other substances present in association with it. Lancereaux, for example, has pretended that it is due to the potassium

sulphate resulting from the plastering of wine, but the disease follows the abuse of such different kinds of alcoholic drinks, *e.g.*, gin, rum, whisky, liqueurs, wine, and beer, which, having alcohol in common, vary otherwise so much in the material from which they are manufactured and the processes they undergo, that the ordinarily received opinion seems to be the most reasonable.

This view by no means pretends to explain the pathological process, or shuts out the possible agency of microbes, or their toxins, especially the bacillus coli, as suggested by Adami and others. The effect of the alcohol may be to depress the vitality of the liver cells, and thereby favour the invasion of that organ by the intestinal bacteria. Adami has shown that dead specimens of the bacillus coli may be found in any section of normal liver, but in the cirrhosed liver of man and cattle, these organisms are not only present in numbers but full of vitality.

It is also quite possible that the abuse of pepper and spice by Europeans in tropical climates aids the effects of alcohol on the liver, for Tinozzi has shown that the addition of pepper or capsicum to the food of dogs and rabbits causes, after a certain time, a distinct increase of the hepatic connective tissue. It was formerly usual to attribute the "liver," which the old-fashioned Anglo-Indian brought home with him, to the abuse of curries and pilaus, and it is possible that we are not quite right in looking so exclusively to alcohol and malaria as the causes of tropical liver, although the above-named dishes are not so generally used in India as they were a hundred or even fifty years ago.

I would beg you to put on one side for separate study the tropical liver, as well as those cases of enlarged liver in which jaundice or pigmentation is an early and persistent symptom. These groups are well defined in their clinical features, and deserve and demand separate study.

Our patient's habits of excessive drinking were only too well marked, and his opinion of what he regarded as moderate quantities is worth noting. It points to the practical conclusion that we should never ask our patients for their opinion of the quantity they drink, if we desire to know the truth. The plan I follow is to ask my patient to describe to me how

he passes an ordinary day, from the time he gets up in the morning until he goes to sleep at night; by this means I get a great deal of information at one time without putting him on his guard. I have his habits as to regularity, exercise, work, sleep, amusement and food, drink and smoking, without any waste of time, and I think I get to know my patient, and am in a stronger position when I come to advise him. It certainly saves one from such an accident, as you have perhaps heard of, where the patient came back to say that he had been obliged to give up smoking the two pipes of tobacco ordered as they always made him sick, but he had done his best to carry out the doctor's instructions; or the other chestnut of the postman who was recommended by his doctor to take walking exercise.

I ask your attention to the fact that the symptoms of alcoholic poisoning showed themselves many years earlier in the nervous system than in the functions of the liver. Eight years ago he had come under treatment for alcoholic neuritis; some might be disposed to explain this, by referring the neuritis to arsenical poisoning, but I have no doubt that the clinical symptoms of cirrhosis of the liver are invariably late in making their appearance. Mind, I do not say that alcohol is late in attacking the liver, for I do not believe that to be the truth. The point, up to which I am leading you, is that cirrhosis of the liver does not cause any marked clinical symptoms in its earlier stages, and passes for years unperceived. In fact, men in apparently good health have been known to die suddenly from some other cause, or have been seized with a first but fatal hæmatemesis, and, *post mortem*, the liver has been found to be in a state of extreme contracted cirrhosis. We will consider the explanation of this later on, at present I desire to impress the fact upon your minds that the symptoms are late in developing, and in no way correspond with the anatomical state of the liver. It is certain that the liver changes in this patient must be dated back to a much earlier period than the nine months history he gave us, for the old notes show that this organ was greatly enlarged in 1897.

The symptoms, of which he first complained nine months ago, were *pain* and *distension* of the abdomen.

Pain is not a marked feature of this disease, especially if persistent and localised as it was in this case, but it is not very uncommon to have perihepatitis present, although the post-mortem appearances do not justify that explanation here, and make it more probable that the pain was caused by catarrh of the stomach or intestines, or of both. The slight *jaundice,* which is not an essential symptom, is usually due, as in this case, to catarrh of the bile ducts, which is an extension of the same process from the stomach and duodenum, and is ultimately due to the direct effect of alcohol on the gastric mucous membrane. Symptoms of alcoholic gastritis, such as flatulence, discomfort, or pain two hours after taking food, morning sickness, loss of appetite, foul tongue, sallow complexion, and constipation, are frequently present, but must not be confounded with the symptoms of the liver disease, as they may be present when the liver is intact, and, conversely, the liver may be profoundly affected in their absence. The truth is that the complex of symptoms, popularly associated with the liver, is in reality dependent upon gastro-duodenal catarrh, with swelling of the mucous membrane lining the orifice of the common duct, which causes slight obstruction to the outflow of bile, with correspondingly slight yellowness of the conjunctivæ from the passage of a little bile into the general circulation.

Terminal jaundice, however, by which I mean that which supervenes shortly before death, is due to partial or patchy parenchymatous hepatitis, or so-called "yellow atrophy," probably due to the action of microbes which have invaded the liver.

The *distension* of the abdomen is caused by flatulence and by the presence of ascites or dropsy of the peritoneal cavity. *Flatulence* is probably dependent to some extent upon the absence of bile, but as it is met with generally, whenever there is want of tone, it is reasonable to attribute a share, here as elsewhere, to the passage of atmospheric air into the stomach and intestines. During inspiration air would be normally drawn into the stomach if the œsophagus were not kept tightly closed by muscular contraction. In swallowing food this obstacle is removed, so that during hurried eating, or when food is imperfectly masticated, air passes into the stomach. In health it is expelled again by the act of belching, but if the

pyloric ring is weak it may pass into the bowel. *Ascites* is the cardinal symptom of cirrhosis of the liver, because it is usually that which directs our attention to the state of the liver. It is directly due to obstruction of the portal circulation, caused by the destruction of the hepatic lobules, by which the radicles of the portal vein are cut off from their connection with the hepatic vein. The characters of the fluid are usually those of a simple transudation, and traces of inflammation, when present *post mortem*, should be regarded as the result of a complicating and probably terminal peritonitis from infection of that cavity, and do not justify the belief that the effusion was originally of inflammatory origin. The destruction of the hepatic lobules is a slow process, and is accompanied *pari passu* by a more or less extensive development of a collateral circulation in the coronary veins of the stomach, the subdiaphragmatic veins, and at times by vessels newly formed in the adhesions between the liver or spleen and the abdominal parietes. These veins unite to join the œsophageal plexus of veins which becomes greatly dilated. Other channels too are afforded by the epigastric veins and other subcutaneous veins in the wall of the abdomen, which were seen in this case to be greatly dilated by a current of blood running upwards. This collateral circulation may be sufficient to compensate for the intra-hepatic obstacle to the portal circulation, and when this is the case the occurrence of ascites is prevented or postponed. Anything, however, which upsets the balance may occasion it. For example, I have known ascites to develop suddenly after a fall on the abdomen by which the liver was perhaps slightly contused, or after a drinking bout. In both cases it is not unreasonable to suppose that there was a sudden excitement of the inflammatory process in the liver with increased exudation and swelling, causing a greater obstruction to the stream of portal blood than could be overcome by the collateral branches, and the over-loaded veins relieved themselves by filling the adjoining lymph spaces or which the peritoneal cavity is the greatest. A clear under-standing of this process is of great importance when we come to discuss the question of treatment.

The *œdema of the legs* occurs later than the peritoneal dropsy, although it sometimes first attracts attention. This is probably because people are more alarmed by being unable

to put on their boots than by finding their abdominal girth increasing, as the latter is not always unpleasing, and is certainly not unnatural. This œdema of the lower extremities is most usually caused by the pressure of the abdominal contents upon the inferior vena cava or its branches, but in the present case it must be, in part at least, attributed to the state of the heart, which at the post-mortem examination was found to be greatly dilated, its muscular walls degenerated, and its valvular orifices so widened, that the valves, although not themselves diseased, must have been functionally incompetent. The dilatation of the heart was noted during life, although there was no alteration of the heart sounds to indicate valvular defect, and it is possible that the condition of this organ changed very much for the worse during the last week or two of the patient's life.

The size of the liver could not at first be made out, but after the abdomen had been emptied of fluid its lower margin was felt two inches below the costal margin. At the post-mortem examination the liver, although very hobnailed and deformed, was rather above the average weight. As a rule the liver dulness is diminished, because the organ shrinks and falls away from the anterior wall, while the distended colon fills its place and gives a tympanitic note which extends even beyond the space it actually occupies. The anterior border of the liver is, as you see, very thin, and would allow the colon to rise in front of it, when floating upon the surface of the ascitic fluid.

No *enlargement of the spleen* was made out when the abdomen was empty, although at the post-mortem examination this condition was well marked; it is, however, possible that the change took place in the month that elapsed between the last tapping and the end.

The *urine* was high coloured, scanty, free from sugar and albumen, but showed a trace of bile pigment. The high colour is generally due to the presence of a large amount of urobilin, but in this case was also partly due to bilirubin ; the scantiness is caused by the pressure on the renal veins ; sugar is rarely present, and any statements to the contrary are to be explained by the patients being examined in circumstances, in which they are able to continue their alcoholic habits, for one of the

commonest causes of the temporary presence of glycosuria is a large dose of alcohol.

It is more surprising that albumen is usually absent, whether we consider the pressure on the renal veins caused by the fluid or the pathological condition of the kidneys. The urine in this case was examined at least every week while the patient was in hospital, and always with a negative result as regards albumen, yet the kidneys *post mortem* showed sufficient parenchymatous and other change to warrant us in speaking of them as inflamed.

The abdomen was tapped as soon as possible after admission, following my usual practice, and 14½ pints of clear fluid were withdrawn. Tapping is indicated when the ascites is sufficient to cause the patient any inconvenience, such as shortness of breath, or œdema of the feet. By removing the fluid we relieve these symptoms, and, if it does not return, we restore him to comparative comfort. If it returns we may, when the indication again arises, repeat the operation, for we may always hope that, in course of time, the development of the collateral circulation will become equal to the portal obstruction and prevent the recurrence. In this case I did not tap a second time, because the fluid returned at once and in 10 days was as great as ever, while the patient's general condition was so bad as to afford little hope of ultimate success. I have had many cases which have given me more satisfactory results. During the last 20 years I have had 56 cases in the hospital, several of them having been under treatment more than once. Of these 40 recovered, while 16 died in the hospital; 12 out of the 40 are known to have relapsed, three are known to be dead, and it is probable that, after this lapse of time, many more are dead. I know the subsequent history of only a small number, but some of these are very encouraging.

Case 3 was tapped four times in five years and after that had no return; I used to show him to the class, but lost sight of him eventually, and I suppose he died.

Case 55 was tapped twice, and then lived comfortably for three years, but died by accidentally taking oxalic acid.

Case 68 was tapped five times between June and October 1901. He is a gentleman's servant, and last August he wrote

me a letter from which the following passages are extracted :—
" I can only say that I never felt so well in my life as I have
done since I was under your treatment in the General Hospital
. . . I take no stimulants whatever. . . . I have never had
the slightest return. . . . I feel as strong as ever I did, which
you will believe when I tell you I have carried 16 stone up
and down stairs every night and morning with the help of
the footman."

Most of the cases cannot be traced after any lapse of time.
Certain it is that, in hospital practice, we hear least of our best
cures. I should have known nothing of the man whose letter
I have just quoted, if a former student, who lives in his
neighbourhood, had not told me of him.

The object of tapping, I hope you will understand, is solely
to get rid of the ascites, the apparent cure which results being
due to the fact that a high degree of cirrhosis of the liver is
not incompatible with good general health. That it is not
always successful may be freely admitted, and its failure has
suggested certain surgical proceedings still upon their trial,
which I will shortly describe. The principle of the operation
is based upon the fact that the ascites is caused by the in-
sufficiency of the collateral circulation, and the object of the
surgeon is to increase this by opening up new channels. The
actual procedure, most in favour, is that of making adhesions
between the abdominal viscera and the wall first proposed by
Prof. Talma of Utrecht ; and the first operation was performed
in 1889 by Van der Meulen, who stitched the omentum to
the wall. His case died after a few hours, and operations
performed by Schelkly and Lens were also failures ; the first
successful cure being effected in 1895 by Mr. Rutherford
Morison in a case of Dr. Drummond's. It is right to mention
that Mr. Morison did not know of the previous unsuccessful
attempts, and that so far as he is concerned the plan was
original. This case died two years later after an operation for
umbilical hernia, and the post-mortem examination proved that
vascular adhesions had been established. In Mr. Morison's
operations he drained the abdomen continuously until no more
fluid escaped, and, after the operation wound had healed, the
abdomen in some cases had to be tapped again. This con-
tinuous drainage is very uncomfortable for the patient, and

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is not employed by Prof. Terrier, who closes the wound at once. This operation has now been performed a great many times. At the French Congress of Surgery, held last autumn, M. Monprofit said that he had collected no less than 224 cases, of which 129 were cures, 84 had died and 11 were doubtful. In the absence of details, which he did not supply, these figures are of little value, except to emphasise the high mortality of the operation, but even for that we ought to know how many were undertaken as a last resource. Morison has had four cases, of which two were cured; one of these was a man, who had been under the care of Dr. George Murray, and was tapped nine times between April and August 1899, the fluid returning after each tapping in increased amount. Mr. Morison operated on August 29th, and the tube was removed on October 10th. The patient did not leave the Infirmary until December 17th, and returned three weeks later with "signs of a large fluid collection in the abdomen; 230 ozs. were removed by tapping." After this there was no recurrence, and the patient remained well up to the date of the report, February 1903. This is a fair example of the results achieved in a case wherein simple tapping had apparently failed; it is quite possible that time may have greatly aided the operation, which did not prevent a relapse. If every case of cirrhosis of the liver with ascites were to be subjected to this operation, there would be doubtless a high percentage of recoveries, and probably, with improved surgery, not a high rate of mortality, but the advantages are not so striking, and the risk is too real to justify our recommending the operation as a routine treatment until simple tapping has had a fair trial. On the other hand, it tends to discredit the operation, if we postpone it too late, or only seek surgical aid when the patient's condition has become grave, as it was in the case which is the subject of this lecture, and perhaps in another case which was operated on for me by Mr. Barling last July, but died of hæmatemesis.

There had been no complaint of any kind of *hæmorrhage* in the present case until February 20th, and it was then so slight that it could be satisfactorily explained by the piles which were present. Speaking generally, ascites and severe hæmorrhage are mutually exclusive. Out of 24 cases of hæmatemesis the coincidence of ascites was noted in only nine;

in two of these the hæmorrhage was very slight, in another the ascites was very slight. We should expect this to be the case, because the greater the dilatation of the œsophageal and gastric veins the less the ascites, while as these veins dilate, their walls may become thin and rupture, causing hæmorrhage.

If a large vessel gives way, the resulting hæmatemesis is usually fatal, but out of the 24 cases, in which this symptom occurred, only 7 died, one of these soon after leaving the hospital.

The source of the final fatal bleeding in the present case was no doubt the ruptured œsophageal vein found *post mortem,* but it is unlikely that the earlier bleedings, only showing themselves from the anus, were from this point, although *post mortem* no other source of bleeding could be found. This is not necessary, as there is no doubt that the mucous membrane of the bowel may bleed freely without any large vessel being involved. It is, however, probable that it is only in the latter case that the bleeding is fatal. Here, in spite of a large quantity of blood having been lost by the rectum, the patient slowly improved, and it was not until the day before he died that he vomited any blood.

The treatment of this hæmorrhage, whether hæmatemesis or melæna, is by rest and the application of the ice-bag, for up to the present no better means are forthcoming.

THE BACILLUS COLI COMMUNIS AS A CAUSE OF SEPTICÆMIA.

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SINCE the first description by Escherich in 1884 of the Bacillus Coli Communis as a normal inhabitant of the human alimentary canal, a considerable change has taken place in the views currently held with regard to the rôle that that organism is supposed to play in human and animal pathology.

Escherich himself, although he had shown that the bacillus could produce a fatal toxæmia in animals, was of the opinion that it was quite harmless to man, and that its importance principally depended on its ability to further the ultimate processes of digestion within the alimentary canal. Before long, however, evidence began to accumulate to show that the organism was widely disseminated throughout the animal kingdom and had pathogenic properties, and in 1887 Javel,[1] of Berne, reported a case of infection of a goitre wound by the bacillus. Four years later Wurtz[2] was able to prove the occasional causal agency of the organism in the following extensive list of pathological conditions :—(1) Cholera nostras, dysentery, membranous colitis, and other intestinal lesions; (2) peritonitis; (3) angiocholitis and cholangitis; (4) cystitis; (5) various pulmonary diseases, including pleurisy and broncho-pneumonia; (6) endocarditis; (7) meningitis; (8) arthritis. This list can now be still further extended by the addition of pancreatitis,[3] mastitis,[4] otitis media,[5] conjunctivitis,[6] and many other conditions, but it is unnecessary to dwell upon these facts, inasmuch as surgeons and bacteriologists have long since learned the pyogenic properties of the bacillus, and are

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[1] *British Medical Journal*, Vol. II., p. 1187.

[2] Wurtz: *Archiv. de Médecine Expérimentale*, 1893.

[3] Welch: *Internat. Journal Med. Scien.*, 1891, p. 443 *et seq.*

[4] *Ergebnisse der Path. und Path. Anat., Lubarsch und Oestertag*, 1898; Jensen: *B. coli als Krankheitserreger bei Tieren.*

[5] and [6] *Ergebnisse der Path. und Path. Anat.*, 1897.

accustomed to suspect its presence more especially in abscesses formed in the neighbourhood of the intestinal canal, while it is also pretty generally admitted that metastatic abscesses may owe their origin in some cases to its action.

In these cases in which the organism acts as a pus producer, some at least of the symptoms from which the patient suffers must be regarded as being of a sapraemic nature, due to the absorption of the colon bacillus toxins, for that it is capable of producing powerfully poisonous substances has been shown by Sidney Martin,[1] Alessandro Carega,[2] and others. Whether, however, the organism can ever assume a septic or septicaemic rôle, as distinct from a pyogenic one, and produce an actual septicaemia, is a point which has not yet been definitely determined, and is the one which forms the object of this paper.

In reviewing the facts that bear upon the question, as far as the human subject is concerned, the evidence in favour of the existence of a B. coli septicaemia may be divided into (1) reports of cases presenting during life septicaemic symptoms, and in which the B. coli was found in the peripheral blood during life ; and (2) reports of similar cases in which the B. coli has been found in the blood and widely disseminated throughout the viscera after death.

If, under the first heading, a large number of cases could be cited, and the bacillus could be proved in such cases to be virulent by animal experiments, the necessary proof would be at once complete. At present, however, there are but few records of cases in which the B. coli has been found in the blood during life, for after a fairly complete search through the literature I have only been able to find the following well-authenticated reports :—(1) A case reported by Henschen[3] in 1901, in which death resulted from septic ulceration of the aortic valves. During life the colon bacillus was isolated in pure culture from the blood in the early stages of the disease, while later on streptococci also appeared ; (2) Siredey[4] reported in 1895 a case of general infection with the B. coli during an attack of influenza, in which the colon bacillus was obtained

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[1] Sidney Martin : *Lancet*, 1898.

[2] Alessandro Carega : "Ueber die aktiven Substanzen des B. Coli," *Centralbl. für Bakt.*, August, 1903.

[3] Quoted by Königer, H. : *Histolog. Untersuchungen in Endocarditis.*

[4] Siredey : Ziegler's *Centralbl. der Path.*, 1896, p. 771.

from the spleen during life ; (3) Kowalewski and Moro[1] reported in 1901 two fatal cases in children in which the B. coli was obtained from the blood during life, and while colitis was found post-mortem ; (4) Sittmar and Barlov[2] recorded in 1894 a case of general B. coli septicæmia following a local infection of the urethra. The B. coli was found in the blood during life.

The very small number of the above cases of course detracts from their value, but, in considering them, it must be remembered that it is only in rare cases that the colon bacillus would be sought for during life, and that in many instances the finding of a bacillus, instead of a coccus, in an obviously septi-cæmic case, would lead the observer, owing to the prevalent views with regard to the etiology of all septicæmic conditions, to believe that he was dealing with an external infection.

The next evidence that must be dealt with consists of the bacteriological findings at autopsies, and here we are met with some surprising results and with varied interpretations of them.

A review of the observations, published during the last 15 years, renders it at once evident that the colon bacillus is frequently found in the abdominal organs post-mortem, and also, but less frequently, in the cardiac blood, and, according to the opinions held with regard to the significance of this fact, bacteriologists may be divided into the following groups :—(1) Those who regard the presence of the bacilli as due to a post-mortem invasion of the tissues through the intestinal walls ; (2) those who believe that the organisms first gain entrance to the body during the so-called agonal period which immediately precedes death ; and (3) those who believe that the B. coli may invade the body during life, either through diseased or healthy intestines, and either, itself producing a septicæmia, modify the course of a previously existing septicæmia, or prepare the way for a septicæmia to be caused by some other organism.

Before the above-mentioned post-mortem evidence can be criticised, however, it is necessary to consider one or two general bacteriological questions, and in the first place we must know what reliance can be placed, from a diagnostic point of

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[1] Kowalewski und Moro : *Klin. Therapeut. Wochenschrift*, 1901.
[2] Sittmar und Barlov : *Deutsch. Archiv für klin. Med.*, Bd. 52, Heft 3.

view, on the finding of any particular organism in the organs
and blood post-mortem. In the early days of bacteriology it
was generally believed that the finding of an organism in the
blood and organs, within a few hours after death, constituted
valid evidence that the bacterium in question had taken a share
in the production of symptoms during life, provided that it
proved toxic when injected into animals. This early view has
of course been modified, and has lately received some consider-
able shocks, for it has been conclusively proved by Ford[1] that
bacteria can be cultivated almost invariably from the healthy
organs of animals, even when the organs are removed imme-
diately after death ; while further, Gradwohl[2] and others have
shown that organisms may rapidly wander post-mortem from
adjacent viscera into the cardiac blood. When, however, Ford's
results are examined into, it is found that he has only dealt with
the abdominal viscera, and that it was only after the lapse of
many days in culture media that growths were obtained from
these—this latter fact suggesting that the bacteria in the viscera
were few in number, and, possibly at first, in an enfeebled state
produced by the activities of the healthy tissue cells. Again,
in his experiments on human organs removed at autopsy, it
is to be noted that only the abdominal viscera were examined,
and, still more important, that in the majority of cases the
same organism was not obtained from each viscus, and that,
in many cases, mixed cultures were obtained from individual
viscera. In consequence Ford's valuable conclusions cannot
upset a post-mortem bacteriological diagnosis when the same
organism is found in pure cultures, widely disseminated through-
out the body, and when it develops rapidly and abundantly
in media, always provided, of course, that the autopsy is made
soon after death, and that the organism found proves toxic
to and is recoverable from animals. Gradwohl's conclusions,
though contradictory to those of some authorities, are suffi-
ciently definite to be accepted. His main statement is that
not only may organisms wander rapidly after death from
diseased organs into the cardiac blood, but also that the

[1] Ford, W. F. : " The Bacteriology of Healthy Organs," *Trans. Assoc. Amer.
Phys.*, Vol. XV., 1900.
[2] Gradwohl, R. B. H. : "Importance de l'Examen bactériologique pratiqué
sur les Cadavres," *Annales de l'Institut Pasteur*, 1904, No. 12

bacteria commonly present in healthy organs may rapidly escape through their walls into the blood vessels, and quickly reach the heart. The acceptance of this statement in its entirety does not, however, invalidate what has been already said, namely, that the wide distribution of an organism in pure culture, throughout the body, especially in a case which presented septicæmic symptoms during life, may be relied on as making a bacteriological diagnosis.

To return now to the bacillus coli. I see no reason why that organism should not be regarded as the cause of septicæmia, if it be found in pure culture widely disseminated throughout the body post-mortem, and if it be proved virulent by animal experiments. Those who deny such a possibility, owing to the frequent occurrence of the B. coli in the organs post-mortem, in cases where it has evidently not been present in the blood during life, would be compelled logically to deny also the existence of a streptococcal or staphylococcal septicæmia, for a glance at the results of Ford, Gradwohl, J. O. Symes[1] and others, show that these cocci are often to be found scattered in viscera post-mortem.

Moreover, when the B. coli has been found in pure culture post-mortem, in cases where there was no suspicion of any septicæmic state, it has, almost invariably, been found only in the abdominal viscera when the autopsy has been performed soon after death, while in autopsies, deferred for twenty hours or more, it has also been found in the cardiac blood. While, therefore, it must be admitted that the B. coli can pass rapidly through the intestinal wall after death, the fact must not be regarded as negativing the possibility of a colon septicæmia.

As regards the occurrence of an agonal inwandering of bacilli through the intestinal wall, opinions are numerous, but evidence is scanty, and what there is appears to show that such an invasion occurs only to a limited extent, and that the organism in such cases does not pass further than the abdominal organs. Birch-Hirschfield[2] admits its occurrence, but lays much more stress upon the post-mortem invasion,

[1] J. O. Symes : " Notes on the Presence of the B. coli and other Organisms in the Tissues after Death," *Lancet*, 1899, Vol. I., p. 365.
[2] Birch Hirschfield : " Ueber das Eindringen von Darmbakterien, etc." *Beiträge für Path. Anat.*, 1898, Bd. 24.

which, he states, frequently occurs. Even if its occurrence be admitted, however, it does not negative the possibility of a septicæmia.

To sum up now the evidence that does exist in favour of the existence of a B. coli septicæmia, we have the following facts :—

(1) Its known power of producing a septicæmia in animals, and in connection with this fact it may be stated that Lésage and Macaigne[1] have shown that the organism, isolated from the intestines in cases of diarrhœa, is much more toxic than that obtained from the healthy alimentary canal. They, in fact, believe that the bacillus of the normal intestines can only exert a local pyogenic toxicity, while that from diseased intestines has septicæmic powers. It may also be stated that Ferranini[2] has shown that the B. coli exerts a much more powerful effect on ill-fed animals than on well-nourished ones ; that, in fact, its toxicity increases with the diminution in resisting power of its host.

(2) The cases already referred to in which the B. coli was found in the blood during life.

(3) Cases of general sepsis reported by Schenck,[3] Gebhard,[4] Kerr,[5] Eisenhardt,[6] and others, in which the B. coli was found universally throughout the body in pure culture after death, and along with these may be mentioned Kamur's[7] work on Winckel's disease.

(4) The occurrence under natural conditions of infectious diseases in the lower animals apparently caused by the colon bacillus.[8]

The power of the B. coli, in modifying the course of, or preparing the way for, other forms of septicæmia, is indicated by the following facts :—(1) Motta Coco,[9] experimenting on animals, found that the B. coli assumed very virulent properties in company with streptococci ; (2) Widal and

[1] Lésage und Macaigne : *Archiv. de Méd. Expérimentale*, 1892.
[2] Ferranini: *Riforma Medica*, 1866, Vol. IV., No. 28.
[3] Schenck: *Archiv für Gynakol.*, Bd. 55, Heft 2.
[4] Gebhard : *Zeitschrift für Geburt und Gynakolog.*, 1897.
[5] Kerr : *Lancet*, 1899, Vol. II., p. 29.
[6] Eisenhardt: *Archiv. für Gynakolog.*, 1894, Bd. 47.
[7] Kamur : *Beiträge zür Path. Anat.*, 14, 1893.
[8] Nocard : *Ergebnisse der Patholog., Lubarsch und Oestertag*, 1898, p. 819.
[9] Motta Coco : *Gazetta degli Ospedali*, XIX., 1898.

Besançon,[1] working with the streptococci of the mouth, ascertained that many, which were harmless when injected alone into animals, became virulent when mixed with the colon bacillus ; (3) Blasi and Russo-Travali[2] reported in 1896 a case of mixed infection with the B. coli and diphtheria bacillus, and found experimentally that a mixture of the two bacilli was much more poisonous than either organism singly. Schenck[3] also reported in 1898 a case of combined coli and streptococcal infection, and makes the statement that the B. coli is always very virulent when combined with streptococci, while, as showing that the opinion that the B. coli might combine with other organisms to produce a septicæmia has been long held, it may be added that in 1896 Sims Woodhead[4] said that he believed many so-called streptococcal infections to be really secondary to colon infections.

From the above reasoning, I think, it may be concluded that the existence of a B. coli septicæmia is probable, and at any rate is certainly not disproved. Possibly its existence accounts in some cases for the inefficacy of anti-streptococcic serum. The following case is, I believe, an example of it, and, as it is of a rather unusual character, the report of it is given in some detail :—

W. M., aged 37 years, married, by occupation a wirer, engaged in setting up telegraph wires, was admitted to hospital on 22nd October 1904, complaining of pains in his head, back, and limbs.

He stated on admission that he had felt ill for the last three weeks, and had been compelled to give up work six days before admission on account of the pains in his bones. He had had no diarrhœa nor vomiting, but suffered slightly from pain in the stomach during the first few days of his sickness. On the evening before admission he had a severe shivering fit, followed by profuse perspiration. He had had no cough nor soreness of throat.

Previous History.—The patient had lived all his life in Ireland, and had been at the same work for several years. The only other sickness that he remembered having was a

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[1] Widal et Besançon : *Revue Trimestrielle Suisse d'Odontologie*, 1894.

[2] Blasi et Russo-Travali : *Annales de l'Institut Pasteur*, 1896.

[3] Schenck : *Loc. cit.*   [4] Sims Woodhead : *Lancet*, 1896, Vol. I., p. 982.

mild attack of rheumatic fever six years previously, for which he had gone to hospital. He had never been a heavy drinker, and he denied having had any form of venereal disease. He had been married for the last twelve years.

Family History.—Father and mother were both dead, but the cause of death was unknown. There were two brothers and one sister, all of whom were alive and healthy. His wife was alive and well in every way. She stated that she had had five children, all of whom were healthy. The last child was born twelve months previously. She had not had any miscarriages.

Condition on Admission.— Patient was a strong-looking, well-built man, in height 5 feet 9½ inches, weight 9 stone 2½ lbs. His expression was rather dull, and a few drops of sweat were present on the forehead. The tongue was lightly coated all over with a thin whitish fur ; teeth good ; throat healthy ; no enlarged glands to be felt in the neck or elsewhere. The thoracic organs appeared quite healthy, except that the first sound of the heart was rather feeble ; pulse 64 to the minute, regular, but very compressible ; respirations regular, 18 to the minute. The abdominal organs all appeared healthy, and although the patient complained of a slight feeling of soreness, there was no tenderness on pressure over the abdomen. Two or three slightly raised papules were present on the abdominal wall resembling the rose spots of enteric fever, but of a darker colour. There was slight subsultus tendinum, but otherwise the nervous and muscular system was quite normal. Urine, acid, sp. gr. 1010, no sugar, no albumen, quantity in first 24 hours = 52 ounces. Temperature 100° F.

Subsequent History.—The patient passed a good night, and on the next morning his temperature was normal, and he expressed himself as feeling quite well except for slight pain in the knee-joints. A blood-examination on this day gave the following results :—

Red blood corpuscles - -	3,300,000 per c.m.
White blood corpuscles - -	30,000 „ „
Differential count of white cells :—	
Neutrophiles - - - -	78 per cent.
Eosinophiles - - - -	2 „
Lymphocytes - - - -	16 „
Hyaline cells - - - -	4 „

A fluid motion was passed on this day, and contained traces of blood, which, however, from its appearance, was evidently derived from some small internal hæmorrhoids. A trace of blood was also found on one or two subsequent occasions, but was always of the same character. During the afternoon the patient 'began to complain of headache, drowsiness, and pains all over his body ; and at 4 p.m. he had a severe rigor, followed by a rise of temperature up to 105·2° F. The temperature remained high for a couple of hours, and then dropped suddenly to normal. During the period of pyrexia there was great thirst, and the skin was hot and dry, and became covered all over with a raised blotchy red eruption. Then, as the temperature fell, the rash disappeared and there was profuse perspiration.

The patient again passed a good night, and felt quite well the next morning, but again during the afternoon had a rigor with a rise of temperature up to 104° F., and symptoms similar to those of the previous day. The temperature again fell rapidly, accompanied by a general amelioration of discomfort. These two days proved to be only the precursors of similar ones, for during the next ten weeks, or, more exactly, 73 days, this type of pyrexia, accompanied by an eruption and joint pains, and followed by profuse perspiration, was repeated daily. The exact hour at which the rigor and rise of temperature took place tended, however, to vary slightly from day to day. A typical example of the temperature chart is represented by the accompanying four-hourly chart, which was taken during the fifth week of illness.

October 1904 TEMPERATURE CHART.
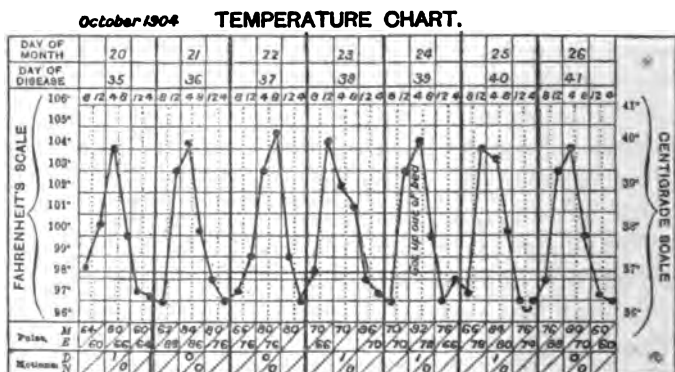
During the first week a Widal test was carried out daily, but always gave a negative result, and on several subsequent

occasions it also proved negative. The agglutination test with two varieties of the paracolon bacillus also gave a negative result. On the eighth day of the patient's stay in hospital some blood was withdrawn from the median basilic vein and was plated out on agar. One colony of staphylococcus aureus developed on the second plate, and was accordingly judged to be a skin infection. On six other occasions an attempt was made to grow organisms from the blood, and the media were varied in the hopes of obtaining a successful result. Thus large quantities of broth were twice used in order to neutralise any possible inhibitory action of the blood. Both, however, remained sterile. In a similar manner milk was used, half an ounce of blood being added to 200 c.cs. of milk. In the first experiment a bacillus developed after five days, and caused curdling, but, owing to an an accident to the culture, the organism could not be identified, and subsequent attempts with the same medium failed to produce any growth. On one occasion 5 c.cs. of blood from a vein in the arm was injected intraperitoneally into a guinea-pig, but without effect.

During the entire period of pyrexia frequent enumerations of the white cells were made, and showed that the leucocytosis present at first was tending to diminish. Thus, on October 5th, the number was 26,250 per c.m. ; on October 20th, 20,100 per c.m.; on November 5th, 17,500 per c.m. ; while a few days later the number was only 12,500 per c.m., and they remained about this level until the termination of the case. Differential counts showed about the same relative numbers as were present at the time of admission. No myelocytes or other abnormal cells were at any time detected. The number of erythrocytes remained at about 3,000,000 per c.m. till towards the end of the case, when the number sank rapidly to a little above 2,100,000.

The urine throughout the febrile period remained normal in quantity and free from abnormal constituents ; the bowels were usually constipated, requiring enemata or mild purgatives to relieve them, but the motions were normal in appearance and after the first there was no abdominal pain. The spleen was normal in size throughout.

The patient himself felt quite well throughout the earlier

hours of each day, except for occasional joint pains, and for a little œdema about the ankles, which caused some discomfort. The eruption, already noted as appearing during the first pyrexial period, was very variable in its occurrence and in its duration. At one time it remained persistent all over the body for several days, and then quite suddenly disappeared. It was at first of a purely papulo-erythematous type, but later on became petechial. The lungs remained healthy throughout, and the heart sounds normal ; the pulse was feeble, but remained slow, and even when the temperature was at its highest point seldom exceeded 80 to the minute. During the first couple of weeks the patient was kept in bed and on a strict fever diet, but later on he was allowed to get up and even occasionally to go out, and his diet was largely increased. His appetite remained good, and he increased in weight from 9 stone 2½ lbs. on admission to 9 stone 9 lbs. on December 2. Various drugs were administered, but all without any apparent effect on the symptoms. Thus at different times the patient was placed on quinine, salicylates, potassium iodide, and mercury. The question of using anti-streptococcic serum was considered on more than one occasion, but owing to the negative results of the blood examinations, and the absence of any apparent focus from which streptococci could enter the system, it was not used. On December 6, the 76th day in hospital, the symptoms began to change. The patient complained of severe headache, and vomited once without apparent cause. The headache was relieved at first by treatment, but returned, and became very severe, persisting on and off for the next couple of weeks. On December 8th, the temperature only rose to 100° F., and then, after a few days of mild pyrexia, became normal, and remained so till three or four days before death, when it sank to 95·4° F. On December 12th, a well-marked Kernig's sign was first observed on both sides, and on the succeeding days the knee-jerks became increased, and Babinski's sign appeared. Some slight spasm of the muscles of the arms was also noted. The pupils became very sluggish in their reaction to light, but an ophthalmoscopic examination by Mr. Benson revealed nothing abnormal with the fundus. On December 13th a lumbar puncture was performed, but no fluid was obtained. On this day the patient was semi-comatose, and he remained so, with slight inter-

missions, until the onset of complete coma about a month later. During this month one curious symptom was present, consisting of apparently intense itching, as the patient used to scratch himself automatically all day, and, in spite of his hands being tied, and of careful watching, he eventually succeeded in producing ulcers in one or two places, which became infected with streptococci and staphylococci, and tended to spread. Loss of the power of swallowing and relaxation of the sphincters finally appeared, and death took place on January 25, 126 days after admission. For two days before death the pulse rate was only 34 to the minute, and the respirations from 6 to 10.

Post-mortem.—This was made six hours after death. The pleuræ and lungs were normal; the pericardium was bound by light, and apparently rather recent, adhesions to the whole surface of the heart; the cardiac chambers and valves and the large arteries were normal. The intestines, on opening the abdomen, were seen to be congested, and a few subperitoneal petechiæ were observed; the peritoneum on the posterior abdominal wall was thickened, and the retroperitoneal and mesenteric lymph glands were somewhat enlarged. The inner surface of the intestine, especially the upper part of the jejunum, showed intense congestion and catarrhal inflammation, while in the ileum the Peyer's patches were reddened and a little raised above the surface; microscopically the patches showed cellular hyperplasia and hyperæmia, but no necrosis. Within the stomach several scattered submucous hæmorrhages were present, but without ulceration; the large intestine was healthy. The mesenteric glands showed some increase of connective tissue, and also large patches of hyaline material. The spleen was normal in size and appearance, both macroscopically and microscopically. The liver and kidneys showed cloudy swelling, but were otherwise normal; suprarenals and accessory glands normal. On removing the calvarium, the convolutions of the brain appeared flattened and unusually dry, and the cerebral veins were dilated; the meninges were quite healthy, and microscopically showed no changes. Both lateral ventricles and the third ventricles were greatly distended with clear healthy-looking cerebro-spinal fluid. The ependyma appeared normal microscopically. The

meninges of the spinal cord were congested, and there was an increase of subarachnoid spinal fluid which was slightly turbid in appearance. The spinal cord itself microscopically was normal.

Bacteriological Examination.—The following cultures were made, the greatest possible care being taken to observe all sterile precautions :—

(1) About 5 c.cs. ot cerebrospinal fluid from the left lateral ventricle of the brain was received into 250 c.cs. of broth.

(2) Agar plates were prepared from the fluid in the right lateral ventricle of the brain.

(3) Streaks of fluid from the spinal canal were made on cold agar plates, and in serum tubes.

(4) Agar plates were made from the spleen pulp, and also streaks of the spleen pulp on agar.

(5) Five c.cs. of blood from the right auricle was received into 500 c.cs. of glucose broth.

In addition to the above cultures, about 5 c.cs. of the cerebrospinal fluid were injected into the peritoneal cavity of a full-grown rabbit. This caused some rise of temperatures and sickness for a couple of days, but the animal eventually recovered.

The above described cultures were incubated for 24 hours, and were then examined. The agar plates from the cerebrospinal fluid and those from the spleen pulp gave a pure culture of the B. coli communis. The growth of cerebrospinal fluid on broth, and of the heart blood on glucose broth, both contained a bacillus which was ultimately identified as the colon bacillus ; and also another organism of a diplococcoid form which will be referred to immediately. The streaks made from the spleen pulp on agar, and also the cultures from the fluid in the spinal canal, contained also the colon bacillus and a diplococcus.

The colon bacillus from each of the above described sources was found to be freely motile, to ferment glucose and lactose, to produce gas and indol, to curdle milk, and to give the neutral red reaction. It was also found that about ·25 of a cc. of its culture in broth proved fatal to full-grown guinea-pigs in about 18 hours, when injected either intraperitoneally or

subcutaneously, and that the organism could be obtained again in a virulent state from the blood and viscera. The attempt to isolate the diplococcus, already referred to, proved a difficult matter, for it appeared only capable at first of growing in a state of symbosis with the colon bacillus on agar, gelatine, blood serum, and alkaline serum. An emulsion of blood serum, in which both the coccus and the colon bacillus were growing, was even injected into a guinea-pig, but only the colon bacillus could be obtained again from the blood and viscera. Finally, plates of Conradi-Drigalski medium were used, and on this some very small, almost microscopical, colonies developed in addition to the colon colonies, and proved to be the pure culture sought. The organism then turned out, as was suspected, to be the pneumococcus, although rather atypical in some of its characteristics. It did not prove fatal to either guinea-pigs or mice, when injected in large quantities subcutaneously and intraperitoneally, nor did it produce pneumonia when injected directly into a mouse's lung.

Sections of most of the tissues were stained to show bacteria, and gave the following results :— In the intestinal wall, and invading the agminated follicles, numerous organisms were found, many of which were bacilli, and did not stain by Gram ; some Gram-staining bacilli and numerous cocci were also found. In the liver, kidney, suprarenals, and spleen numerous non-Gram-staining bacilli were found. No organisms were found in the heart wall. In the meninges of the brain and just beneath the pia mater numerous non-Gram-staining bacilli were found, and also in a few sections some diplococci resembling those found in the cultures. No organisms were obtained in sections of the ependyma.

The post-mortem findings in this case are, I think, quite sufficient to justify the conclusion that the B. coli was the principal factor at work in producing the symptoms. It is hard to believe that it could be found so universally in the body, in so virulent a condition, and so far from the intestinal tract as the cerebrospinal fluid of the lateral ventricles, if it had entered post-mortem, or even during the prolonged agonal period. It may be, I think, admitted that the non-Gram-staining bacillus found in the sections was the colon bacillus. The fact, that so many different varieties of organisms were found in the intestinal sections, also supports the conclusion that this case

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was one of a true colon infection, for if the B. coli entered the vessels post-mortem it is hard to see why the other bacilli were prevented from doing so. The mere motility of the colon bacillus could not explain such an occurrence as Gradwohl's investigations show.

The part played by the pneumococcal organism it is impossible to state, but the fact that, it had lost all toxic properties, seems to show that its influence was quite a secondary one, and the difficulty of obtaining a growth apart from the colon bacillus points in the same direction. Most probably, however, it aided in increasing the virulence of the other organism. If the case had been primarily a pneumococcal infection, one would expect more marked local phenomena, and, in accordance with the results of Widal and Besançon, one would expect the virulence of the pneumococcus to be increased rather than diminished. It has been too long believed that the colon bacillus is capable of overgrowing other organisms, but, that opinion is beginning to alter, is borne out by some of the statements in the recent Erasmus Wilson Lectures of Dudgeon and Sargent.[1] Again, the local intestinal lesion that was present, and of which the early abdominal pain may have been a symptom, and the enlarged mesenteric glands, point much more strongly to the colon bacillus than to the pneumococcus. Some experiments are at present being carried out to see if the pneumococcus obtained can heighten the virulence of other strains of the colon bacillus.

It is of course unfortunate that no growth could be obtained from the blood during life in this case, but the absence of such growths does not prove the non-existence of organisms in the peripheral blood, as it is a well-known fact that the results of blood cultures during life are very uncertain. Frequently a growth may be obtained on one day and none at all on the next, or organisms may even be found in stained preparations of blood, which has failed to develop anything when grown in the ordinary nutrient media.

My thanks are due to Professor A. C. O'Sullivan and Dr. J. T. Wyham for aid and suggestions in carrying out the bacteriological investigation of this case. The last-named was also good enough to examine the spinal cord for me.

[1] *Lancet*, February and March, 1905: "Peritonitis: a Bacteriological Study," by L. S. Dudgeon and Percy W. G. Sargent.

VALVULAR DISEASE OF THE HEART.

I.—MITRAL STENOSIS.

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WE are all very familiar with cases in which the physical examination determines the presence of narrowing of the mitral orifice and no more ; we see daily cases of double mitral disease in which the evidences of obstruction lend all the strong colours to the clinical picture ; in what follows it is the former condition alone that I have in mind. Current descriptions are in sufficient disagreement to justify the feeling that there are still not a few crooked places to be made straight, not a few rough places that yet need smoothing. Obstruction without insufficiency may, and probably often does, exist in the earliest stages that follow close upon an acute infective process, that leaves but a slight and marginal affection of the cusps, such as not to preclude their adequate, if not accurate, coaptation. This condition is seen more often in children than in adults, and harmonises with the singular purity of the auscultatory evidences, which is so often noticeable in childhood. A priori one would expect also to find unmixed obstruction, when the morbid process originates in the auriculo-ventricular ring without initial affection of the valves, but, from the examination of very many hearts after death, I am doubtful of the very existence of such a condition, unless it be in exceptional cases of congenital origin. Morbid anatomy therefore compels the conclusion that narrowing of the mitral orifice without insufficiency is indeed a rarity. Accepting this view, an attempt must at least be made to explain the absence of any clinical evidence of the associated defect. It has been suggested that the regurgitant current from the ventricle is held up by the unduly forcible contraction of a hypertrophied auricle : this postulates the prolongation of auricular systole beyond the commencement of ventricular systole, of which we have no evidence : moreover, in several cases, clinically determined to

be pure stenosis, I have noted the absence of any semblance of hypertrophy of the left auricle. Perhaps a more satisfactory explanation may be found in the condition of the auricular chamber itself, which, in view of the resistance offered by the contracted orifice on the one hand, and of the high pressure in the lungs and right ventricle on the other, can hardly be even approximately empty at any period of the cardiac cycle.

With a view to ascertaining the frequency of apparently pure stenosis, relatively to other diseases of the mitral valve, I have analysed 2,230 cases of mitral disease : in 1,025 of these, or 46 per cent., simple regurgitation was present in 901, or 40 per cent., the double lesion ; and in 304, or 14 per cent., apparently pure stenosis : thus stenosis, with or without regurgitation, was present in 54 per cent. of all affections of the mitral valve.

Mitral stenosis is typically a lesion of adolescence, though exceptionally it arises in infancy or at advanced age. Cases of infantile origin, however, are apt to remain latent, until puberty and adolescence, by their greater demands on the nutritive powers of the organism, bring it to light : moreover, in adolescence the heart is growing rapidly in size, so that, if meantime the mitral orifice is contracting and growing smaller, a disproportion is established between the orifice and the chambers of the heart, that upsets circulatory equilibrium In illustration of these points I have tabulated the age of admission to hospital, or of coming under medical supervision, of these 304 cases of mitral stenosis, as under : —

Under 10 years	-	-	-	0·6 per cent.
Between 10—20 years	-		-	21 ,,
,, 20—30 ,,		-	-	28 ,,
,, 30—40 ,,	-		-	25 ,,
,, 40—50 ,,	-		-	17 ,,
,, 50—60 ,,	-		-	5 ,,
Over 60 years	-	-	-	3·4 ,,

It is reasonable to presume that at any rate before admission to hospital the lesion will have been of some years' standing.

Turning to the proportional incidence of pure stenosis on the two sexes, of these 304 cases, 215, or 78·5 per cent., were females, and 59, or 21·5, were males. Whence comes this special susceptibility of the female sex ? Statistically I find that

rheumatic fever accounts for close on half the cases of mitral stenosis, to which a definite cause can be assigned. Of 150 cases of pure mitral stenosis, 72 were directly referable to rheumatic fever, 2 to rheumatic fever and chorea, 12 to chorea, and 10 to scarlet fever. Of 300 cases of mitral stenosis with regurgitation, 178 were directly referable to rheumatic fever, 11 to rheumatic fever and chorea, 29 to chorea, and 8 to scarlet fever. Actually rheumatic fever is a far more frequent cause of stenosis than these figures indicate, as it nearly always originates in childhood, when the evidences of rheumatic fever tend to be vague, aberrant, and abarticular, so as often to escape detection. Now, statistically also, rheumatic fever is decidedly more common in males than in females—in 342 cases (admitted to an equal number of male and female beds) 220 were males, 122 females—so that it follows that the special incidence on the female sex has to do with some factor apart from the chief exciting course of the obstruction. It can hardly be that, in the dynamics of the circulation, there exists a force tending to combat contraction in the male, or to promote it in the female. Conceivably adhesion of the cusps would be more readily effected in the less active circulation, but at once the objection occurs that mitral stenosis, in its inception, is essentially a disease of childhood or early adolescence, when there is but little difference in the calls made by the two sexes on the work of the heart. This would seem to drive one to attribute it to the relatively smaller size of the orifice in the female, which, in cases not directly due to adhesion of the cusps, is difficult to reconcile with accepted physical laws.

Of the association of mitral stenosis, with arterio-sclerosis and granular kidney, I have no sufficient statistics, but Goodhart and Pitt have shown its comparative frequency from the post-mortem records of Guy's Hospital.

Such an analysis of the chief exciting causes is sufficient justification of the recognition by French authors of two salient types of mitral stenosis, " rétrécissement mitral rheumatismal" and " rétrécissement mitral artériosclereux." The rheumatic type is common, and liable to acute exacerbations, that make its course fitful and irregular, while the arterio-sclerotic type is relatively rare, and its progress regular and sure. The erratic

course of mitral stenosis of infective origin stands too in marked contrast to the uniform and steady progress of mitral regurgitation.

Pulmonary tuberculosis has been held by Potain and Teissier to be a frequent cause of mitral stenosis. I have been unable to confirm this, as in 112 autopsies I find only 2 records of pulmonary tuberculosis, active or obsolete : in the same number of cases, pleural adhesions, more or less extensive, were present in 48 cases, but there was nothing to indicate a tubercular origin. Once acquired, mitral stenosis unquestionably exerts an arresting influence on tuberculosis of the lungs, either by inducing a condition of passive hyperæmia, or a state of diminished oxidation of the blood, which is uncongenial to tuberculosis. Mitral stenosis, even more than other forms of chronic heart disease, is apt to take on the outward aspect of pulmonary tuberculosis. There are the same types of faces, the face that is pale and thin and worn, and the fuller face with a dusky flush of the cheeks. There is the same poor physical development, and the chest is apt to be narrow and inelastic. There is the same burden of breathlessness and cough, the same liability to recurrent attacks of bronchitis, with or without hæmoptysis. In my experience, pallor is more frequent than the dusky flush of the face, which sometimes denotes the lesion : it is as difficult in mitral stenosis to fill the arteries as it is to empty the veins : over and above this, I have noted no exceptional association with chlorosis, as has been asserted.

In all the hearts, that I have seen at death, or examined in museums, I have failed to find evidence of the acquired lesion commencing in the auriculo-ventricular ring and spreading thence to the cusps : the line of march is invariably in the reverse direction. In recent cases there is commonly a fringe of soft vegetations along the margins of the cusps on their auricular surface : in older cases sclerotic processes in the cusps : these changes, be they vegetative or sclerotic, are apt to extend to the chordæ tendineæ and musculi papillares. Crumpling of the cusps is apt to give the orifice a slit-like form, that has been termed a "buttonhole," while adhesion of the margins and shortening of the chordæ and musculi papillares tend to induce a conical form that has been termed a "funnel." It is a pity that terms of precision have been

employed to indicate conditions, that have no precise con-
formity, so that each observer uses them somewhat differently.
A buttonhole is essentially rectilinear : the so-called button-
hole mitral orifice is essentially curvilinear and crescentic.
The most valuable statistics, I can supply on this point, are those
of King's College Hospital, where the post-mortem records
have been in the same hands for upwards of 20 years, and
preserve therefore the same nomenclature. Of 104 cases, 52
are described as buttonholes, and not one as a funnel : this
accords with my own experience of 14 buttonholes out of 22
cases, and not a single funnel. Next in frequency to the
buttonhole is a circular form, which, in low degrees of con-
striction, varies but little, except in size, from the normal, but, in
high degrees, becomes a flattened and calcareous diaphragm
with a small central orifice. The smallest orifice of this kind,
that I have seen, just exceeded 1 inch in circumference : the
smallness of this is best realised by rolling 1 inch of paper
into a circular form. In this connection Sansom's figures
demand consideration : he found 8 funnels to 1 buttonhole in
childhood, and 25 buttonholes to 1 funnel in adults. This
would suggest, either that the funnel is peculiarly fatal, so that
its victims do not grow up, or that the funnel is converted in
later life, either into the buttonhole, or some other form, such
as the flattened diaphragm. I have searched for evidence of
intermediate forms at intermediate ages, and have failed to find
it, nor have I obtained from those, who have an unequalled
experience in children's hospitals, any confirmation of so
frequent an occurrence of funnel-shaped contractions. The
obvious conclusion is that the term has no uniform and
accurate significance in morbid anatomy, for the true funnel
is seldom seen except in museums.

Some diversity of opinion exists as the exact condition of
the left auricle in mitral stenosis. Some valuable statistics by
Samways from the *Guy's Hospital Reports,* from which he builds
up a strong case for the existence of simple hypertrophy of the
left auricle, induced me some years since to turn special atten-
tion to this point. In 22 cases that have come under my own
personal observation I have found only two conditions : in 14,
dilatation of the chamber with more or less hypertrophy of
the muscular wall, in 8, simple dilatation. I have never seen

unmixed hypertrophy even in subjects dying of intercurrent disease : the appendix of the auricle, however, not infrequently presents the appearance of unmixed hypertrophy, and projects from the auricle as a rigid flap. These observations are confirmed by the records of various other hospitals, but I am unable to tabulate the statistics, as frequently no mention is made of the special point. That hypertrophy of the left auricle should exist without dilatation is most unlikely, for a persistently increased and increasing *vis a tergo* is constantly in operation to distend the auricle. When also we remember that obstruction can seldom exist apart from incompetence, even though the latter may be clinically hidden, it is difficult to see why hypertrophy should be produced without dilatation. No doubt some portion of the dilatation is a terminal product of cardiac failure, but while allowing for this, we must not forget to set rigor mortis on the other side of the equation. The greatest dilatation co-exists with the highest degrees of constriction, and the greatest hypertrophy with the moderately high, while, with the low degrees, the changes are very slight in either direction. If further confirmation of the existence of dilatation as an essential phenomenon of mitral stenosis be required, it is readily supplied by auscultatory percussion of the back, which seldom fails to elicit a marked vertical increase of dulness : moreover, the familiar accumulation of thrombi in the left auricle would be more compatible with a chamber of which the ratio of power to capacity is diminished rather than increased. Emboli, in the systemic circulation, were present in 19 out of 112 autopsies, and in many instances, in which there were no emboli, the presence of thrombi in the left auricle was recorded. The whole question is further complicated by the frequency of adherent pericardium, which was present in 45 out of the same 112 cases : this, of course, is due to the frequency with which mitral stenosis originates in childhood, when endo-pericarditis is common.

As with the left auricle, observations as to the condition of the left ventricle in mitral stenosis differ widely. *A priori* one would expect to find reduction in its capacity. Since less blood than normal is passed over from the left auricle, and therewith also there should be diminution in thickness of its muscular wall, for there is less blood to pass over into

the aorta. Actually this is very seldom the case, though the large right ventricle gives an impression of atrophy of the left ventricle, which is apparent, not real; the effect is also heightened by the spread of the enlarging right ventricle in front of the left ventricle, so as almost to displace it from view. Commonly the left ventricle is hypertrophied, with some dilatation. It is not easy to see how this is brought about. To me the only satisfactory explanation is that suggested by Gibson, who ascribes it to the increased aspiratory force, exerted by the left ventricle in its effort to overcome the obstruction, diastole being an active muscular process. It is needless to say that enlargement of the left ventricle and increased thickness of its walls will be found in those cases, in which stenosis has followed in the train of general arterio-sclerosis and granular kidney, and usually when the pericardium is adherent.

It is surprising to find that emboli in the lungs are not much more frequent than emboli in the systemic circulation. In 112 autopsies they were present in the lungs in 25 cases, as against 19 in the systemic circulation : they are not always due to emboli from the right auricle, but sometimes also originate in patches of atheroma of the pulmonary artery, consequent on the blood pressure, which is persistently higher in mitral constriction than in mitral regurgitation, for in this latter a period of relief occurs at every ventricular diastole. For this same reason hæmoptysis is more common in mitral stenosis than in mitral regurgitation : in 50 cases of mitral stenosis, hæmoptysis was present in 16, absent in 34 ; in 50 cases of mitral regurgitation, it was present in 7, absent in 43 : in 50 cases of the combined lesion, it was present in 10, absent in 40. Hæmoptysis, therefore, was present in 32 per cent. cases of mitral stenosis, 14 per cent. of mitral regurgitation, and 20 per cent. of double mitral disease. Hydrothorax similarly preponderates in mitral stenosis : in 50 cases, it was present in 14, absent in 36 : in mitral regurgitation, present in 10, absent in 40 : in the combined lesion, present in 7, absent in 43. Hydrothorax, therefore, was present in 28 per cent. cases of mitral stenosis, in 20 per cent. of mitral regurgitation, and 14 per cent. of double mitral disease.

It will be convenient to speak of the pulmonary valve

incompetence, that sometimes accompanies mitral stenosis, when we consider the physical signs, for no evidence of this is found post-mortem : probably as soon as the strain is relieved, the elastic pulmonary artery contracts down to its normal size.

The right ventricle from the first feels some of the strain, which is not borne entirely by the thin-walled left auricle, and undergoes hypertrophy : the hypertrophy is greatest in the highest degrees of constriction, but in the final stages dilatation supervenes, and may lead to incompetence of the tricuspid valve. The frequency, however, with which tricuspid stenosis accompanies mitral stenosis is not sufficiently recognised. In 177 autopsies, it was present in 40 cases : the degree of constriction is usually slight, but when of high degree the right auricle is found distended, sometimes to the size of a tennis-ball. Twice, with extreme tricuspid stenosis, I have found clotting in the left innominate, internal jugular, and subclavian veins.

In 78 out of 112 autopsies, the liver was found to be large and typically nutmeg in appearance, and, from the clinical records, I can fully confirm Broadbent's observation that ascites is usually prior to œdema of the legs : it is actually more common. With the lungs, liver, and eventually the pleura and peritoneum functioning as large reservoirs for effusion, it is no matter for surprise that subcutaneous anasarca is significantly slight and often absent.

Breathlessness is almost invariably the earliest symptom that turns the patient's mind inwards : as the orifice narrows, there are, in some cases, distressing attacks of paroxysmal dyspnœa. Pain, although a much less common symptom, frequently is the immediate cause that induces the patient to attend a hospital. Hospital records commonly define it as pain in the left side, and so it mostly is : its habitual site is inside and below the apex, and less frequently just external to the apex : in a very few cases, it is over the right heart on either side of the sternum. I have not found a single record of a case of mitral stenosis presenting the classical features of angina pectoris, but now and again I have met a condition that may fairly be termed pseudo-angina.

In a typical case, the impulse is seen to the left of its normal situation, and is a short sharp thrust in character :

there will often be epigastric pulsation, and, in cases of long standing, there may be visible pulsation over the front of the heart and in the second left intercostal space.   This last is commonly regarded as the pulsation of the dilated conus arteriosus, while others hold that it is the enlarged left auricle. I fancy that neither view is wholly correct.   In two well-marked cases, I satisfied myself, by means of the cardiograph, that the pulsation is not synchronous with the apex beat, but just precedes it : this would suggest that it is due to auricular systole.   I had the opportunity of seeing both these cases in the post-mortem room, and in neither was there any ground for thinking that the left auricle had been in contact with, or even in close proximity to, the anterior wall of the chest. Granting the accuracy of these observations—and, with so unreliable an apparatus as the cardiograph, this proviso must be made—the most likely explanation is that the pulsation is left auricular, but is communicated to the chest-wall by the medium of the enlarged and rigid right ventricle. ˙ Possibly it may be ventricular, for the ventricles may be, and in mitral stenosis often are, asynchronous in action ; but, if we accept the delay of the right ventricle in mitral stenosis, and this is compelled by the fact that the later element of the re-duplicated second sound is most intense in the pulmonary area, the pulsation should be a little later, not a little earlier, than the apex beat.

The area of heart dulness is usually increased, except when the obstruction is infinitesimal : the increase is both to right and left, and the upward limit is often raised.

An increase, in the vertical extent of the left auricular dulness, may usually be detected by auscultatory percussion of the mitral area in the back : looking at the relations of the left auricle in the cadaver to the aorta, spinal column, and lung, it is easy to understand the difficulty attaching to accurate delimitation of the transverse limits, even when the enlarged auricle has pushed aside the intervening lung.

In about one-third of the cases a thrill is felt, which alone suffices to make the diagnosis : it is usually presystolic in time, and terminates in the abrupt apex beat : less commónly it fills all, or nearly all, the diastolic phase, but even then its intensity is almost always greatest in the late diastolic period.

It is usually situate just above the apex beat, but its area is less circumscribed than is generally taught. I have a series of tracings recording the complete area : the most common line of extension is towards the sternum, and very occasionally it passes even beyond this : two tracings are of thrills, with murmurs, in the second left interspace only, and in each case there was evidence of a general raising of the heart. The coarser the thrill, the less, as a rule, the obstruction, and the finer the thrill, the more. The thrill is apt to disappear in heart-failure under the same conditions as the murmur.

When the hand is laid flat on the præcordium—that is to say, with the palm on the right ventricle and the fingers outwards towards the apex—a slight heaving is often felt beneath the palm, just prior to the presystolic thrill. Occurring as it does as a late diastolic phenomenon, it is difficult to refer it to anything but transmitted systole of the left auricle. It is not due to systole of the right ventricle, for that is felt independently, and it is too late in occurrence to assign to filling of the left ventricle under the heightened activity of diastolic aspiration. On the other hand, it is not synchronous with the thrill, but just prior to it, and one is tempted to believe that the heave of auricular systole may be felt earlier than the vibrations it induces in the current of blood, which it propels through the constricted orifice. Close on this heave follows the presystolic thrill, which in turn terminates abruptly in the short sharp thrust of the apex beat. The closure of the pulmonary valves can usually be felt in the second left intercostal space.

Smallness is an invariable characteristic of the pulse, and is a valuable indication of the degree of constriction of the orifice : in late stages, it is often unequal and irregular. Inequality tends to precede irregularity : to such a degree may this be the case that some beats fail to reach the wrist, so that the heart is regular, but the pulse irregular and intermittent. These features merely express the fact that, owing to the constriction of the orifice, the ventricle receives persistently small, but still very unequal, charges of blood : and in late stages, when the coronary arteries are ill-served by the low aortic pressure, it is inevitable that these defects of motility should be greatly enhanced. Very divergent opinions have been

expressed as to the tension of the pulse : I would not say that it is a high-tensioned pulse, but rather that, bearing in mind the nature of the lesion, it is surprisingly high. Broadbent assigns this modified high tension to the effect of the whole arterial system contracting down on the diminished supply of blood which it receives, and it is difficult to see any other reasonable explanation of the undoubted clinical fact : we find, in aortic regurgitation, an analogous instance of the vessels accommodating themselves to valvular defects.

Listening to the heart sounds, one finds a mere repetition of what has already been discerned by the hand : indeed, to him who would rightly understand and treat a case of mitral stenosis, the hand is as sure a guide as the ear. Just above and internal to the apex beat, is heard a diastolic murmur : commonly it is late diastolic or presystolic in time and crescendo in character, and terminating abruptly in the brief slapping first sound. But sometimes the murmur may fill the whole of diastole, and then commonly wanes in intensity towards mid-diastole, and then waxes again to systole : or, again, the murmur may be early diastolic only. These variations of rhythm of the murmur, like the collateral varia-tions of the thrill, depend on the relative power of the three agencies—the *vis a tergo* of the pulmonary circulation, the aspiratory energy of the left ventricle, and the left auricular systole — that are active during diastole in promoting the passage of blood through the obstructed orifice. The pre-systolic murmur, or a murmur with a presystolic termination, is usual while compensation is good : murmurs of other rhythm are apt to arise in failing compensation. Likewise, in early cases, the murmur is commonly low-pitched, while murmurs of higher pitch are generally late events, and associated with the finer thrills. The slower the heart-beat, as a rule, the longer and louder is the presystolic murmur : hence, with the per-sistent acceleration of advanced stages, the murmur becomes shorter and less distinct. Variability of the murmur is very rare in early stages, very common in late, and is dependent on the ebb and flow of strength of the agencies that produce the murmur. The murmur is, as a rule, localised to the apex, but I have graphic records of considerable areas of conduction : the common lines of carriage are transverse, outwards to the

axilla with an upward tendency, and inwards with a tendency downwards to the epigastrium, and occasionally even to the right of the sternum. I have recently had under my care two cases, in which the presystolic murmur was heard in the left subclavicular region and second interspace : in one, it was faintly audible also at the apex, in the other, there was no trace of abnormality at the apex : in each case, there was evidence of a high position of the heart.

We may take it that the old controversy, in which one set of disputants sought to refer the presystolic murmur to the systolic period, is dead, though now and again a belated echo is heard. Gairdner and others have produced demonstrative disproof. Further, inasmuch as the diastolic murmur of mitral stenosis may immediately follow the second sound, and terminate with an appreciable interval before the first sound commences, it is clear that this murmur cannot be of regurgitant type, and strongly suggests that the same is true of the presystolic murmur also. Moreover, it should be noted that the conductivity of the presystolic murmur is totally different from that of the systolic mitral murmur, which could hardly be the case, if both were produced by the same mechanism. When, too, there is a double mitral murmur, the two elements occupy each a distinct area, the presystolic being nearly always heard to the inner side of the systolic : when this is seemingly not the case, the systolic is, in all probability, of tricuspid origin.

There is no absolute rule governing the greater or less intensity of the murmur of mitral stenosis according to posture : theoretically it should be loudest, and often is, in the erect posture, but quite often the reverse will be found to be the case, as though auricular systole were doing more when there was more to do.

Sometimes, even in relatively early stages, the murmur is absent, but still the lesion can be recognised by the associated changes in the movements and sounds of the heart, and by the pulse. The familiar disappearance of the murmur in the terminal stages may reasonably be referred to the failing strength of the left auricle and right ventricle, and to the constriction having reached a degree, at which the stream,

which finds its way through, is hardly sufficient to produce audible vibrations. Yielding of the tricuspid orifice is less common than is believed, and has probably very little to do with this disappearance.

As constriction of the mitral valve not infrequently exists in the absence of a murmur, so a murmur not infrequently exists in the absence of constriction. More than once, in cases of mitral regurgitation, I have seen an unmistakable presystolic murmur disappear as circulatory equilibrium was restored. Bearing in mind the association of presystolic murmurs with adherent pericardium, aortic regurgitation, and dilatation of the left ventricle—in all of which conditions such dilatation is the common factor—it is reasonable to presume that this also is the condition in mitral regurgitation. There is then, of course, a stream of blood passing;through a relatively narrow orifice into a relatively wide chamber beyond, and possibly the stretching of the musculi papillares and chordæ tendineæ may so dispose the valves, during diastole, as to produce a temporary obstruction.

As we have said, the murmur ends in the sharp rap of the first sound: now, there are only four factors that can contribute to this characteristic but much-debated phenomenon : these are the muscles of the right and left ventricles respectively, and the mitral and tricuspid valves. Of these, the mitral valve may be at once excluded, as it is usually rigid and immobile. It is tempting to refer it to sudden tension of the tricuspid valve, but as this valve also is affected, in nearly one-quarter of all cases, this can hardly be. To my ear it has the timbre of a a muscular and not of a valvular sound. It is difficult to exclude the muscle of the right ventricle, which is in front of the left ventricle, but the sound is quite the reverse of what one would expect with a thickened wall and a well-filled chamber. Now the muscle of the left ventricle is quite often unchanged, while the character of the sound is almost constant, so that we must look, not to the muscle itself, but to the contents of the chamber on which the muscle acts : these have undergone a simple diminution, and no explanation seems to me to fit it so well as the idea of the left ventricle contracting down sharply and quickly on an ill-filled cavity,

instead of the gradual compression of one that is well filled. Moreover, one can but associate its production closely with the short sharp thrust, which is that of the left ventricle.

The second sound may or may not be audible at the apex : when present, it is often not easy to hear because the ear hardly has time to clear itself of the reverberation of the slapping first sound. The frequent absence of an audible second sound at the apex, though the pulmonary second sound is loudly accentuated, confirms the view that the apical second sound is of aortic origin. In mitral stenosis, there is from the first a progressive attenuation of this sound, leading up to its complete disappearance : no doubt over and above its increasing emptiness ; the displacement of the left ventricle away from the chest wall contributes to this.

Over the pulmonary base is usually heard an accentuated, and often reduplicated, second sound : it can usually be determined that the later and louder element is most intense in the pulmonary area, indicating delayed closure of the pulmonary valves, as the right ventricle takes longer to expel its contents into its efferent artery. Normally, the pulmonary valves close slightly ahead of the aortic valves, and, in the normal heart, very careful auscultation will often afford the slightest indication of a double-headed sound, and, in mitral stenosis, the duplication becomes far more distinct. But it is no longer the pulmonary element that is ahead, for the right ventricle will take longer to empty itself than the left.

There is apt to be as much variability about the reduplicated second sound at the base—appearing and disappearing with the varying strength of the heart—as about the presystolic murmur itself. In early cases of mitral stenosis, a reduplication of the second sound is sometimes heard at the apex : in two cases that I have watched over a period of years, I have seen this gradually unfold into a presystolic murmur and a second sound. To the ear it is at first the purest reduplication, but I believe it to be a diastolic murmur in embryo. That in early stages it should be an early diastolic murmur, and in late stages a late diastolic murmur, is an objection to this view : others have preferred a more recondite interpretation, and have termed it the " claquement d'ouverture de la mitrale," assigning it to the inrush of blood into the left ventricle, causing a tension

sound of the mitral valve, while the first part is the second sound. Under what influence is this inrush ? If under the influence of energetic diastole of the left ventricle, may not this also produce an early diastolic murmur, which, as hypertrophy of the auricle arises, gives place to one that is late in diastole.

Pulmonary regurgitation is occasionally found. Recently I have had under my care a little girl in whom it was absent at rest and present during exertion : when present, it was not heard at every closure of the valves, but only in expiration. Presumably this variation was real, not apparent only, for expiration should naturally intensify the leak, while the subsidence of the intervening lung should make it more audible.

As we have seen, the diagnosis of mitral stenosis presents but little difficulty, even in the absence of a murmur. Aortic regurgitation can hardly give rise to confusion, though either murmur may encroach on the territory commonly occupied by the other : the familiar full low-pitched blowing murmur of aortic regurgitation has nothing in common with the thin faltering character of the early diastolic, still less with the crescendo rumble of the true presystolic : the latter is often associated with a thrill, the former very seldom : in the former, the chief enlargement is in the left heart, in the latter, in the right : and the pulse is quite distinctive. On the other hand, there are no criteria for distinguishing the murmur of virtual mitral obstruction, present in some cases of aortic insufficiency, from that of true stenosis. Mitral stenosis is occasionally mistaken for tricuspid stenosis, but the murmur, when one exists at all, is located over the mid-sternum, is less harsh and less loud, and is not accompanied by the reduplicated second sound with accentuation of the pulmonary elements.

It is difficult to make any precise statement as to the duration of mitral stenosis : my series of cases gives 34–35 as the age at death for males, and 40–41 for females, but many factors vitiate the conclusions derived from hospital statistics : nor are these any sufficient index of its duration in a higher social order, for so much depends on the general health and surroundings of the sufferer. Everyone will agree that mitral stenosis is more serious than aortic stenosis, and less than

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aortic regurgitation, but opinions conflict as to the relative gravity of mitral stenosis and mitral regurgitation : for my own part I hold that mitral stenosis is the heavier burden to bear, and theoretical considerations strengthen this opinion. Occurring in childhood, or in adolescence, the outlook is more serious than in later life, for though the heart continues to grow, the orifice cannot, so that a further disproportion between orifices and cavities is established : moreover, a fresh attack of rheumatism is more likely to occur in the early years of life. In individual cases, prognosis is much aided by a knowledge of the auscultatory features of successive degrees of constriction. In gauging these, the character of the murmur, the size and rate of the pulse, and the audibility of the aortic second sound are the safest guides, for so many subsidiary factors complicate the enlargement of the right ventricle and the accentuation of the pulmonary second sound.

In the absence of pulmonary complications or embolism, death is due to complete cardiac failure after a succession of breakdowns : sudden death from diastolic arrest is very rare. The heart is able neither to empty the veins nor to fill the arteries, but it is the former disability that commonly administers the coup de grâce.

The foregoing considerations indicate clearly the appropriate lines of treatment. In the early years of rapid growth of the body care should be taken of the state of general nutrition. Cod-liver oil, arsenic, phosphates, and iron for anæmia are needed, with nourishing diet and life in the open air. When rheumatism has been the exciting cause, every effort must be made to stave off a second attack by residence in a dry locality, and if in spite of this the enemy effects an entry, prompt measures must be adopted. Violent exertion in games or otherwise must be forbidden. In the case of a woman, the question of marriage will often arise : she must be told clearly that her health will be prejudiced by becoming a mother, and still further by any attempt to nurse her child.

When definite symptoms have arisen, it is to the avoidance of pulmonary complications that chief care must be devoted, because of the strain they exert on the right heart. In the stagnant condition of the pulmonary circulation, a common cold seldom fails to excite a troublesome bronchitic attack.

Cardiac irritability and pain will require rest, avoidance of all mental and physical stress, 'bromides, or, better, hydrobromic acid, and other sedatives : a belladonna plaster is often a useful adjunct. Diet should be shorn of all cardiac excitants, such as tea, coffee, and wine, and tobacco should be abjured.

Hæmoptysis may occur before there is any serious breakdown of compensation, but is never severe, and only requires rest and aperients to lower the blood pressure.

Mitral stenosis is essentially a lesion, in which as much or more may be done by diminishing the resistance in the circulation as by increasing the power of the heart : rest, a relatively dry diet, warm clothing, and free action of the bowels, all promote this end. When complete breakdown, however, occurs, not to employ the specific cardiac tonics, and particularly digitalis, would be to discard a most valuable auxiliary. If more time be given to the left auricle to unload itself, this must in turn react beneficially on the right ventricle : still, we recognise that there are high degrees of constriction, in which the right ventricle is powerless to bear the load of backwardation, and that digitalis, when powerless for good, is necessarily potent for harm, by urging the weary right ventricle to exhaust its residue of energy. Digitalis may often be usefully combined with carbonate of ammonia, or with a vaso-dilator, such as liquor trinitrini.

In higher grades of failure leeching and venesection may be necessary, followed by digitalis. In such a case the pulse will be small, weak, and irregular, with some beats not perceptible at the wrist, while the right ventricle is heaving and struggling, and all its venous tributaries are turgid, and dyspnœa agonising. Paroxysmal dyspnœa is sometimes much relieved by the hypodermic administration of atropine.

The suggested enlargement of the orifice by tenotomy will never find a place in practical therapeutics. The operation may be feasible on the normal heart of the human cadaver or of the living cat, but, if essayed on the rigid and often calcareous structures of mitral stenosis, will not only produce no appreciable enlargement, but will also tend to set free loose fragments into the systemic circulation.

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THE, SEPARATION; OF THE URINE OF EACH KIDNEY.

A DISCUSSION OF RECENT METHODS OF DIAGNOSIS IN URINARY SURGERY.

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THE desire for more accurate localization and diagnosis in renal disease dates from the Gustav Simon's pioneer operation in 1869. The early operations upon the kidney were naturally performed upon cases, in which the presence of disease in one kidney, was obvious. The question at that time was not, as now, whether the second kidney was so far diseased as to contra-indicate nephrectomy, but whether the human subject could survive the removal of one kidney, the other being healthy.

In the kidney, as in other organs, operative attack laid bare the limited means of diagnosis at the command of the surgeon, and stimulated further effort in the direction of greater accuracy.

At the present day the surgeon is faced by two problems when he approaches a case of renal disease.

In the first place, which kidney is diseased, and having decided this, the second question presents itself, what is the functional power of the healthy or the less diseased kidney ?

The first question may often be settled without difficulty, and without the employment of any special method. Enlargement, displacement, or tenderness of one organ may be detected on palpation, or the enlargement may even be visible to the naked eye. Renal pain may be unilateral, and so marked as to leave no doubt as to which kidney is diseased. The introduction of the X-rays, besides giving valuable information in diagnosis, was a further step in advance in the localization of renal disease.

There are, however, cases—and these form no inconsiderable

proportion of the cases of surgical renal disease—in which the surgeon is left in doubt as to which kidney is the source of hæmaturia, or of pyuria, and these constitute one class to which the various methods of separation of the right and left urines are applicable.

I shall later discuss the relation of the cystoscope to these separators, but it may at once be said that the use of the cystoscope in skilled hands will obviate the necessity for separating the urines in a large proportion of this class of cases.

The second question is one which may present itself suddenly to the surgeon during the course of a renal operation. A kidney is found extensively diseased, and it is considered advisable to remove it. The question which must at once be decided is whether the second kidney is sufficiently healthy to undertake the entire renal function, or indeed, does a second kidney exist. Or the surgeon may have previously decided to remove the diseased kidney, and wishes information in regard to its neighbour before committing himself to a prognosis. In the settlement of this question there are two methods at our disposal. Separation of the bladder into two halves by a septum and draining each half, and catheterization of the ureters.

Historical.—Before describing the methods of separating the urines, a short note of the evolution of the instruments is not out of place.

In 1874, five years after the first nephrectomy by Simon, Dr. Tuchmann, of the German Hospital (London), perfected an instrument by which he was able to collect the urine from one kidney. In this, as in most of the earlier devices, the dominant idea was to obstruct, by some means, the stream from one ureter while that from the other was collected. In the later methods, the principle has been to drain the urine from each kidney separately and simultaneously.

Dr. Tuchmann's instrument was not unlike the modern lithotrite in form. The blades were, however, smooth, and made to approach each other by means of a light spring. The application of the instrument depended upon the fact that the ureters open upon a transverse ridge. By repeated

practice, the inventor was able to pinch up this ridge with the "ureteral forceps," and thus occlude the opening. The bladder urine was now derived entirely from the unobstructed kidney, and was drained through openings in the shank of the instrument.

In the following year, 1875, Simon succeeded in passing a fine catheter into the ureter of a female subject. After introducing his forefinger along the urethra into the bladder, he was able to locate the ureteral ridge by the sense of touch, and by this means to guide a catheter into the ureteral opening. This method, which was only applicable in the female, necessitated the use of an anæsthetic.

Grünfeld's work on endoscopy appeared in 1881, and he described his efforts to pass instruments into the ureteral openings. For this purpose, he used a straight tube with a window and reflected light as an illuminant. He admitted that, " on account of many optical and anatomical difficulties, he had only succeeded in finding the ureteral openings by means of the endoscope in the female bladder."

Polk suggested the introduction of a metal catheter of sigmoid contour into the bladder. The curve of the catheter was made to " hug the right pelvic wall," and the end of the curve lay across the line of the right ureter. Two fingers were introduced into the rectum and pressed against the catheter, and by this means the ureter was occluded. The lumen of the catheter, meanwhile, drained the urine from the other kidney. " In the female the procedure is more certain of accomplishment than in the male, because we can in a measure fix the base of the bladder by traction upon the anterior vaginal wall by means of a tenaculum hooked into it just below the cervix."

Early in 1883, Newman, of Glasgow, devised and used an electric endoscope and ureter catheters. The electric lamp was introduced into the bladder through the speculum. Two gum-elastic catheters were passed along the urethra outside the tube, and manipulated into the ureters.

In 1883, Weir suggested the occlusion of one ureter by the pressure of a Davy's lever in the rectum against the ileopectineal line. Sands had previously tried to carry this into effect by means of the index finger.

Polk and Ebermann endeavoured to pinch the ureter with a two-bladed instrument, one arm of which was introduced into the rectum and the other into the bladder.

Silbermann approached the ureteral opening more directly, and endeavoured, by means of an indiarubber ball, which he introduced into the bladder and filled with quicksilver, to occlude one opening. The success of this method was marred by the rupture, on several occasions, of the rubber ball and the outpouring of the fluid mercury into the bladder. A recent adoption of this principle is described by Rochet and Pellanda, who distend a rubber tube with air to obstruct the flow from one ureter.

Sänger and Hegar described the palpation of the lower ureter in the female from the vagina, and the former recommended the exposure and temporary ligature of one ureter from the vagina. Under Sänger's direction, his assistant Warkalla successfully performed, in 1886, the temporary ligation in 10 out of 13 bodies on which the attempt was made. Sänger concluded from these experiments as follows : " In general, ligature of the ureter from the vagina appears to be much preferable to any of the intravesical methods of occlusion of the ureter, with the object of collecting the secretion of each kidney, and it is even better than the direct catheterization under the guidance of the finger in the vagina."

In 1886, Pawlik published the description of a method, he had used since 1881, by which the female ureter might be catheterized without illuminating the bladder and without the necessity of a preparatory operation. In one of his cases a permanent uretero-vaginal fistula had become established after a removal of the cervix by means of the thermocautery. After practice on this case, he was able to introduce a sound into the bladder opening of the ureter, without the aid of a guiding sound in the ureteral fistula. He used two guiding points in practising his method, (1) the position of the trigone of the bladder as felt on the anterior wall of the vagina, and (2) the prominence of the lower ureter on overfilling the bladder.

Hurry Fenwick described an instrument in the same year, by means of which suction was applied to one or other ureter, and the urine collected.

Catheterization of the ureters, after opening the bladder,

has been proposed by some surgeons. Thus, Emmet recommended vaginal cystotomy ; Harrison, perineal cystotomy ; and Guyon, Albarran, and Iverson, suprapubic cystotomy, as preparatory measures to ureteral catheterization.

In 1889, Brenner, in America, modified Leiter's posterior cystoscope by adding to it a fine tube, which opened immediately below the window. Along this a catheter could be passed and manœuvred into the ureteral opening. Tilden Brown added a double channel for catheters in order to drain both ureters simultaneously. Later (1891), Nitze applied the principle to his cystoscope, placing the catheter opening upon the concavity of the beak. Modifications of these instruments have been introduced by Casper and Albarran.

In 1893, Kelly made use of the Sims position, and a short straight tube to obtain atmospheric distension of the bladder in the female. By means of reflected light he was thus able to examine the interior of the bladder, and inspect and catheterize the ureters.

A new principle in urine separation was propounded by Lambotte, of Brussels, in 1890. His idea was to create a partition in the bladder, which would divide it into two halves, each of which contained a ureteral opening, and thus received the urine from one kidney. These urines could then be drained off separately. In Lambotte's instrument the septum was made of caoutchouc. The instrument and its use remained in obscurity, however, and the same principle was made use of by Alfred Neumann, of Guben, in 1897, and to him the credit of originating the idea appears to be given by some French authorities.

In 1898, Harris, of Chicago, introduced an instrument on somewhat different lines. His object was to create a median longitudinal ridge in the floor of the bladder by the pressure of a lever in the vagina or rectum, and to drain the depression each side of this.

In 1901, Dr. Luys, of Paris, described an instrument on similar lines to that of Lambotte, and this was followed, in 1902, by another separator, invented by Dr. F. Cathelin, also of Paris.

The Methods at present in use.—At the present time, two methods are available for collecting the urine of each kidney

separately. In one, the bladder is artificially divided into two compartments, into each of which a ureter opens, and from each of these compartments the urine is drained. This is achieved by means of urinary "separators," of which the recently invented instruments of Luys and Cathelin represent the most perfect mechanism. These instruments will, therefore, be described.

In the second method, a catheter is introduced into the ureter, and this tube is, therefore, prolonged to the surface, without the intervention of the bladder. This object is attained in two ways, either by means of the catheter cystoscope, of which the instruments of Nitze, Casper, and Albarran are now in use, or by distension of the bladder with air and catheterization by what might be termed the "open method" of Kelly through a tube. The latter method is applicable only to the female bladder.

I.—METHODS OF SEPARATING THE VESICAL URINE.

A.—*Luys' Instrument.*—Dr. Luys' separator consists of a shank and a handle. The shank is formed by a central metal stem, flattened from side to side, on each side of which a metal
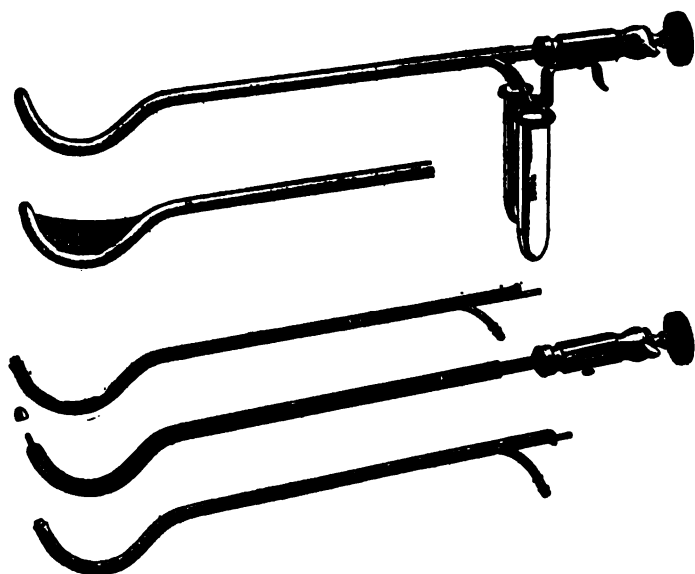
Fig. 1. *Dr. Luys' Separator.*

catheter is fitted. The distal end of the shank is curved to the extent of about half a circle—the curve being so placed that when the instrument is held horizontal, all of the curve, except the very tip of the instrument. lies below the level of the straight portion of the shank. The central stem is inseparable from the handle of the instrument, but the catheters may be removed.

Attached, almost to the end of the central flattened stem, is a fine chain which, when loose, lies snugly in the concavity of the curve, and is connected under a bridge, with a fine rod passing along the upper surface of the straight portion of the stem. When drawn tight by a screw in the handle, the chain bridges across the half circle curve like the string of a bow. A· fine rubber tube fits over the whole of the median stem, allowing a screw at the tip of the stem to pass through an opening at its end. With the chain slack, the rubber-covered central stem retains its peculiar curve, with the chain taut, the half circle curve is filled in by a rubber membrane. This forms the septum for dividing the bladder into two parts.

The metal catheters, which fit one on either side of the central stem, have a flattened inner and a rounded outer surface. They fit into the handle on either side of the base of the stem, and are prolonged to its tip, being fixed to it and to each other by a metal cap, which forms the point of the instrument. Openings are provided in each catheter at the upper part of the inner surface, and in the depth of the curve, and the catheter passes outwards and downwards from the handle at the proximal end. The curve of the central stem appears below the catheters, so that when lying in the bladder, the lower border of the septum is formed by the stem and not by the catheters.

The handle is provided with a movable holder for two small glass tubes, which hang under the openings of the catheters, a cross bar, to ensure steadiness, and a screw to draw the chain tight. The membrane having been drawn over the central stem, the catheters are fitted on either side, and the tip screwed on, and the instrument is ready for use.

Technique.—The patient lies on his back on a couch, or better still on a gynæcological chair. The bladder is carefully

washed until the fluid returned into a glass vessel is clear. Six or eight ounces of fluid are allowed to remain in the bladder. Fifteen or twenty minims of a five or ten per cent. solution of cocaine are instilled into the posterior urethra. The instrument is well oiled and introduced into the bladder. The instrument passes easily until the curve lies in the prostatic urethra. It is now necessary to make the curve ride over the vesical opening of the urethra and lie upon the base of the bladder. This is accomplished by depressing the handle of the instrument deeply between the thighs, and, at the same time, pushing onwards. A bowl should be placed in readiness between the patient's thighs to catch the fluid, which at once begins to flow, when the beak of the instrument enters the bladder. The patient is now gently raised to a sitting posture. If a special chair is available, this is easy, if on an ordinary high couch, the patient swings slowly round, and sits on the edge with the feet on a chair. In the female the introduction is easy, and the patient may from the commencement of the operation lie with the pelvis at the end of a couch with the knees flexed and the feet on the edge of the couch. The screw of the instrument is now turned and the chain thus made taut, forming a membranous septum in the bladder. The instrument is held in the median line of the body with a very slight upward inclination. The fluid in the bladder drains off and starts the syphonage by which the urine is drawn. The first fluid is discarded, and the tubes are placed in position, about 20 minutes being required to fill them with freshly secreted urine.

(b) *Cathelin's Instrument.*—Dr. Cathelin describes his instrument as follows:—The graduated vesical separator consists of a cylindrical tube corresponding to a number 25 charrière, the tunnelled beak of which is the size of a number 2 lithotrite.

The common tube encloses 3 others. A median tube in which runs the stem of the membrane carrier. At the vesical extremity of this is fixed a metal spring curved on itself, which can be projected from the tube and expand in the form of a large racquet. This spring forms the frame for a rubber membrane. The membrane is projected by pushing in the shank, and retracted by withdrawing it. When in position the membrane is held vertically in the median line in the bladder. The curve of the beak allows it to lie comfortably behind the

pubis and to fit the neck of the bladder accurately. Further, the median tube is so fashioned at its vesical extremity that the membrane, instead of unfolding in a horizontal line with the tube, expands before reaching the angle of the instrument. and thus closes the neck of the bladder and the posterior urethra.
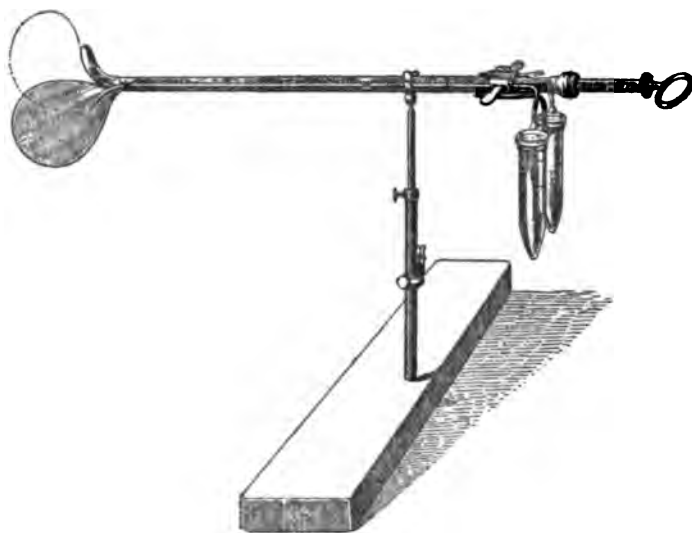
Fig. 2. Dr. Cathelin's Separator.

The shank, which glides in the median tube like the piston of a syringe, is graduated according to careful calculation, and the figures correspond exactly to a vesical capacity of from 10 to 300 grammes. The two lateral tubes allow of the passage of fine catheters, which emerge from two eyes, obliquely set on the lateral aspects of the vesical end of the common tube. An important point is that these eyes are in the prostatic urethra and not in the bladder. A support with a movable rest is provided and steadies the apparatus in the median line. Graduated tubes attached to the two sounds receive the urines. Some minor changes have been made in the original instrument as experience has dictated. The catheters are now made of metal and a crosspiece has been added.

Technique.—The tube and membrane are sterilised in boiling water. The patient lies on the back with flexed knees. The bladder is washed out until the fluid returns clear, at the

same time, the exact capacity of the viscus is estimated and it is filled with fluid until the patient feels a desire to urinate.
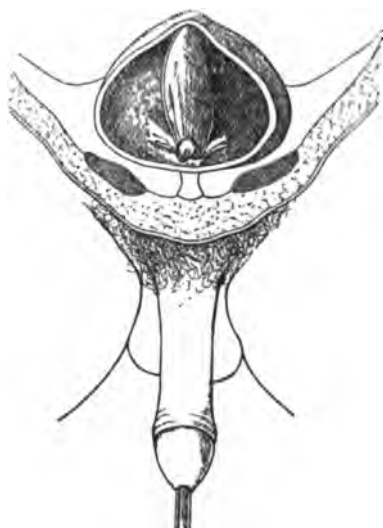
Fig. 3. *Dr. Cathelin's Separator in Position.*

The instrument, well oiled, is introduced, and when in the bladder the two catheters are pushed forward for 3 or 4 centimetres according to the capacity of the bladder. By drawing the instrument gently towards oneself until the resistance of the pubis is felt against the beak, the instrument is made to lie accurately in the bladder neck. The instrument is held in an almost horizontal position inclined very slightly upwards. The shank is then pushed in, and the markings on it watched, until the figure, corresponding to the previously estimated bladder capacity, is reached. The expanded membrane now fits the bladder cavity and the fluid is allowed to flow off.

2.—CATHETERIZATION OF THE URETERS.

a. *The Catheter Cystoscope.*—The catheter cystoscope may be used in the male or female subject with equal facility. Three instruments are at present in use, those of Nitze, Casper, and Albarran. The principle underlying these instruments is the same. Along the upper surface of the ordinary cystoscope there is a tunnel which opens just short of the

prism window. When the ureteral catheter is passed along this tunnel, and the point projected from the opening, it is seen on looking through the prism, and may be guided into the ureteral opening. The point of the catheter projects obliquely from the opening of the tunnel, and is introduced into the ureteral opening, partly by manœuvring with the cystoscope, and partly by pushing the catheter onwards. Lateral movements are performed by moving the whole instrument, but the curved beak limits to some extent the vertical approach to the ureteral opening, if the point of the catheter is to be kept within the limited field of the prism. It is therefore an advantage to be able to change the direction of the exposed catheter tip, and bring it more vertical to the cystoscopic tube. Albarran made this possible by means of a tiny movable gutter at the opening of the tunnel, which could be made to " sit up " into a more vertical position by means of a screw at the proximal end of the instrument. This ingenious device has since been adopted in the Nitze instrument. The canal in Casper's instrument is so made that the catheter forms a wide angle with the shaft, and the vertical direction of the catheter may be changed, by advancing or retiring the roof of the tunnel, which is detachable. Another point of importance in ureteral catheterization is, that in some cases it is important to collect the urine from each ureter simultaneously. The Nitze instrument is ill provided for this purpose. With this instrument it is necessary, after passing one catheter far into the ureter, to draw the instrument gradually out while at the same time the catheter is pushed forward, and eventually is left *in situ*, as the cystoscope is withdrawn from the bladder. The cystoscope is now reintroduced, charged with a fresh catheter with which to sound the second ureter.

Casper meets this objection by an ingenious contrivance. The roof of the catheter canal is movable and can be drawn out, leaving the catheter in the urethra. This movable roof performs another function. The further it is pushed in along its groove, the more its distal end presses upon the catheter, and the more vertical is the end of the catheter bent. Casper's latest instrument is provided with a double tunnel, so that both ureters may be catheterized without removing the cystoscope.

The ureteral catheters are of fine calibre. Those now made have a fine bulbous tip and a lateral eye. Albarran threads his ureteral catheters upon a fine bougie which has been passed
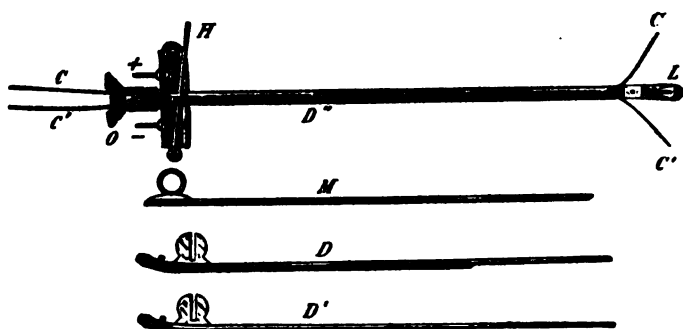
Fig. 4. *Professor Casper's Catheter Cystoscope.*

into the ureter, and uses catheters with an open end and lateral eye.

A fine stylet may be used, but should not reach the end of the catheter. The stylet is not, however, necessary. Catheters, coloured black and yellow in alternating centimetres, give an accurate means of measurement of the distance the instrument has travelled along the ureter.

Technique of Ureteral Catheterization.—The antiseptic and manipulative precautions, necessary in bladder surgery, are as indispensable here as in the methods of urine separation. They need not be detailed.

Two attributes are essential to the surgeon, who attempts ureteral catheterization, some degree of manipulative dexterity, and a thorough knowledge of the use of the cystoscope. Possessed of these, ureteral catheterization does not present great difficulty in the majority of cases in which it may be used.

The bladder is washed out thoroughly with boric lotion until the fluid returns clear. An absolutely clear medium is advisable, but not indispensable, for the operation may be performed in a slightly hazy fluid.

A distension of 8 to 12 ounces is the best for ureteral sounding. A greater distension tends to flatten out the ureteral ridge, and the operation is rendered somewhat more difficult, a less amount leaves the bladder mucous membrane in folds

and interferes with the manœuvring of the instrument in the cavity.

The patient lies upon the back, with a hard pillow under the hips. A special chair is an advantage, but by no means a necessity. A general anæsthetic is only called for in exceptional cases, in most, local anæsthesia is sufficient. The ureteral catheter is laid in its tunnel, but not projected from the opening, and the instrument is passed into the bladder.

The window is at once turned directly downwards, and this brings into view the inter-ureteral ridge. By following this ridge outwards the slit-like opening of the ureter is seen. The catheter is now projected to bring the tip well into view, and the cystoscope is manœuvred into position so that the catheter, when projected, enters the opening. The approach is the part of the proceeding which gives most trouble, and no description can replace practice. The cystoscope is gripped in the prostatic urethra and vesical outlet, so that the beak travels in the opposite direction to the eyepiece. When in position for the sounding of the left ureter, the eyepiece will be well over to the right thigh with the beak turned downwards and a little outwards. The value of the mechanism for changing the direction of the catheter is now appreciated. The opening of the ureter is usually picked up by the point of the catheter, which approaches it from within outwards. With the tip in the ureteral opening, the catheter is gently pushed onwards with the right hand, keeping the cystoscope steady in position with the left. A ridge is seen to pass along the mucous membrane outwards for a short distance as the ureter swallows the catheter. Before commencing to push the catheter onwards, the directing gutter at the opening of the tunnel may be returned to its longitudinal position as it may retard the movement of the catheter. As the catheter is pushed gently on, it may bend up in the bladder. This may be due to the operator allowing the cystoscope to change position while intent upon the passage of the catheter, or the catheter may be caught in a fold of ureteral mucous membrane. It should be withdrawn slightly, and gently pushed on again. Sometimes, without any stricture being present, the catheter only passes a short distance along the tube.

It is not necessary to pass the catheter more than one or

two inches along the ureter if the object be merely to collect the urine from the kidney.

Frequently on introducing the catheter no urine appears for some seconds, sometimes as many as 30 seconds elapse before the fluid begins to drop from the catheter. The urine comes away in a characteristic manner. Four or six drops dribble out in rapid succession, then a pause of about 6 seconds, and then another succession of drops.

Casper points out that, if the catheter be pushed on into the pelvis of the kidney, this characteristic rhythm disappears, and the drops fall continuously.

b. *Kelly's Method of Catheterization of the Ureters in the Female.*—With a short straight tube in the urethra, and the pelvis well raised, the atmospheric pressure distends the female bladder. This is the principle on which Kelly's method is based. Illumination is obtained by reflection from a head mirror or an electric head lamp. The patient lies, either in the dorsal position with the knees flexed and the pelvis well raised, or more often in the knee-breast position. The former position is only serviceable in spare women. The urethra is dilated with a conical metal bougie, to allow of the introduction of a straight tube, 3½ inches in length, and of suitable calibre. The bladder is at once distended by the inrushing air. Any part of the female bladder can now be inspected. The ureteral openings are located, and ureteral catheters are passed along the tube, and manœuvred into the ureteral openings. Kelly uses metal catheters, if the urine merely requires to be drawn, but flexible catheters, with a stylet, are required, if it be intended to introduce the instrument far into the ureter. The stylet is withdrawn when the catheter is safely within the ureteral opening and the flexible catheter pushed onwards. There is a tendency for some urine to collect at the lower part of the bladder, and this may obscure the openings. To obviate this a suction apparatus, consisting of a fine rubber tube with a bulb, has been used.

THE CASES SUITABLE FOR THE USE OF THESE INSTRUMENTS.

There does not at first sight appear to be a very wide field for the application of these ingenious devices. But although

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the number of cases in which their use is imperative is somewhat limited, yet the cases are many in which valuable information can be added to previous knowledge.

The catheter cystoscope has other advantages besides that of collecting urine from each kidney, which give it a wider sphere of usefulness, and which are not possessed by the separator. These advantages need not be discussed here.

The following types of cases are suitable for the application of the instruments :—

    1.—Cases in which an operation is proposed on one diseased kidney, and information is desired in regard to the function of the second kidney.

    2.—Cases in which hæmaturia or pyuria of *known* renal origin is present, but it is uncertain which is the diseased side.

1.—Cases in which Information is desired in regard to the Function of the Second Kidney.

The question of the functional value of the second kidney may arise either before, or during, operation in any form of surgical disease of the kidney.

Without the opportunity of examining the unblended urine of the second kidney, and in the absence of obvious signs of disease of the organ, the surgeon depends upon statistics and upon his personal experience, either in the post-mortem room, or as an operator. It must be evident that the experience of the individual surgeon in renal surgery varies very widely, and is frequently but a narrow base, on which to take the risk of removing diseased kidneys, and it is to the last degree unlikely that the surgeon has prepared himself in the post-mortem room for the possible contingency now under consideration. Most decisions are therefore based upon statistics, or collected opinions, of the experience of several surgeons. Statistics have only a certain value. It is known, for instance, that renal growths are unilateral in over 89 per cent. (Kelynack) of published cases. This percentage is therefore accepted as a guarantee that, in removing a kidney, containing a renal growth, little or no risk is run of the patient having submitted to a useless operation from the presence of a second tumour in the remaining kidney. Again, it is known that the ratio of

solitary kidneys is 1 in 2,650 cases (Morris), and that a kidney may be removed, with but small chance of the patient being dead of uræmia, in a few days, from the removal of his entire urinary secretory apparatus.

These facts are so well known that the question of the second kidney in such cases may never occur to the surgeon. But even the small chance of a nephrectomy of a solitary kidney must be reckoned with in renal surgery, as may be realised on referring to the case recently recorded by Mr. Lynn Thomas, which occurred in the hands of one of his colleagues. Professor Schulze, of Jena, has described a similar case, and there are others on record and doubtless many unrecorded.

Apart from these rarities, however, there is a large number of patients, who suffer from some renal disease, which is notoriously bilateral in its later stages.

These cases include certain forms of renal stone, tubercular disease, and suppurative diseases of the kidney. The manner in which the second kidney is diseased, is not in point ; it is sufficient that its function is damaged to a varying degree. In operating upon the obviously diseased kidney in such conditions, and especially in proposing the removal of the organ, a certain unknown risk is undertaken. We have it, on the authority of experienced surgeons, that this risk may be left to chance, and, further, that many such operations are successfully performed where the remaining kidney is diseased. These successful cases, in which the remaining kidney was diseased, are recognised and accepted by even the most ardent advocates of urine separation, but the suspicion must arise that they are counterbalanced by an, at least, equally large number of cases, that have not found their way into medical literature.

Further, it is urged that the additional information, gained by ureteral catheterization, is likely to deter the surgeon from operating in cases, where disease of the second kidney is present, but where this organ is still able to carry on the usual function unaided. This is not, however, accurate. The aim of the surgeon, in using the urine separation, is to estimate, so far as he is able, the functional capacity of the second kidney, in order to judge, not only of the presence, but of the extent of disease, and to try, if possible, to estimate the capacity

of a diseased second kidney to carry on its work. To exclude, in fact, from operation, the balance of cases, which undoubtedly exists, in which the second kidney was so far diseased, that an operation was hopeless from the first, and should never have been undertaken.

2.—Cases of Kidney Disease in which Hæmaturia, or Pyuria, is present, but it is uncertain on which side the Disease is situated.

Here we come to a parting of the ways between the catheter cystoscope and the urine separator.

Let us consider first the case of the urine separator.

In cases where the disease is accepted as renal, the signs which led to the diagnosis of a renal affection, as opposed to a vesical disease, will, in the majority of instances, also demonstrate the side on which the disease exists, and the urine separator only demonstrates what is already obvious. Hæmaturia or pyuria, with an enlarged kidney and without marked vesical symptoms, may be accepted as originating in connection with the kidney which is enlarged. The separator at least gives us no further information on that point.

Again, pain in one kidney, or renal colic on one side, accompanied by hæmaturia or pyuria, may lead to a diagnosis of renal disease, which again the separator cannot improve upon. Further, certain fallacies exist in regard to pain as a localizing symptom in urinary disease ; for instance, where a papilloma, or malignant tumour, exists in the bladder at, or close to, one ureteral opening, pain may be experienced in the corresponding kidney, and lead to a diagnosis of renal disease. The separator, if used alone, would appear to confirm this erroneous diagnosis. It cannot therefore be claimed that the separator in itself has any function as a localizer of disease.

If, before using the instrument, the bladder be examined with the cystoscope and vesical disease excluded, these fallacies would not exist, but the use of the separator as a means of localizing the disease, would be superfluous in many cases, for the blood or pus could be seen issuing from the corresponding ureter. There are, however, a few cases in which a small amount of pus from the kidney is present in the urine, insufficient in amount to discolour the jet issuing from the

ureteral orifice to be observed with the cystoscope. In such cases, the separator will render assistance, but only after excluding bladder disease with the cystoscope.

If, further, hæmaturia without other symptoms has occurred, and the bleeding has ceased, here again conclusions, based upon slight differences in the urines, obtained by means of the separator may be fallacious, if no previous cystoscopy has been made. Bleeding may here have a renal source, or may arise from a papilloma at one side of the bladder.

If in such cases, the separator is used after a cystoscopy, it gives information which is equal, or some may think superior, to that given by the catheter cystoscope.

I would, therefore, state my opinion that the use of the separator begins and ends with the drawing of urine from each kidney, after the diagnosis of renal or ureteral disease has already been made, whether by cystoscopy, or by other means.

With the catheter cystoscope, however, it is a different matter. The same instrument, that localizes the disease to the kidney, and shows that the bladder is healthy, is used to collect the urine of each kidney.

It has been said (Bickersteth), that in examining with the cystoscope a ureteral opening, from which blood is issuing, the surgeon must be "quick or the fluid in the bladder will have become turbid before he has made his observation," and it is inferred that, on this account, the separator is a more reliable instrument. As a matter of fact, almost pure blood may be observed by the surgeon, and demonstrated to several onlookers before any obscurity of the medium has interfered with the view. And further, the fallacy already referred to, in regard to hæmaturia, necessitates the use of the cystoscope before the introduction of the separator.

In reading the cases, which have been recorded to show the value of the separator, it is well to remember that the information gained might equally well have been obtained by other means. Some of the cases are indeed merely demonstrations that the separator is a practical instrument, and that it is in working order. Thus, the flow of urine from one catheter to the separator, and the absence of flow from the other, in a case in which one kidney had been removed, or was known to be destroyed by disease, is merely a striking demonstration of the

completeness of the vesical septum. It is an exercise which every one might well adopt to test their skill in the use of the instrument.

SOME DIFFICULTIES AND FALLACIES.

Ureteral Catheterization.—The difficulties of ureteral catheterization are, firstly, those of cystoscopy. The surgeon, who would perform the operation, and obtain reliable information, must be a skilled cystoscopist, and this at once narrows the general use of the method. Apart from this, however, there are other difficulties.

The medium, with which the bladder is filled, must be clear. This point has, I think, been somewhat overstated. In the first place, many of the cases, in which ureteral catheterization is useful, are those in which the bladder is normal, and there is no difficulty in obtaining a clear medium. The addition from the ureter of a few drops of bloody or purulent fluid to twelve ounces of clear medium, at the rate of four to six drops every twelve seconds or so, does not interfere with the operation to the extent that some have supposed. And, moreover, the bladder fluid need not be so absolutely clear, if the operator is accustomed to the manœuvre.

A cloud of phosphatic débris, or mucus, may obscure the opening of the ureter, and necessitate re-washing.

In cases where well-marked general cystitis is present, the ureters may be completely obscured and catheterization impossible. But these cases are unsuited for catheterization as they are for separation ; for the bladder holds but a small amount of fluid and resents the introduction of any instrument.

In chronic cystitis, where the bladder can retain sufficient fluid for ureteral catheterization, the openings may be difficult to find, but this is by no means the rule.

The manœuvring of the cystoscope beak into position presents no great difficulty to the cystoscopist. The position of the ureteral openings varies greatly in different individuals, without departing from the normal, but this does not interfere with the operation.

The openings have been placed on the back of a ridge, so that attempts at catheterization were unsuccessful.

I have met with one case, in which the bladder base was

infiltrated by old standing inflammation, and the ureters opened as immobile round holes in a rigid floor. In this case I failed, after several attempts, to pass the catheter, being unable to get the catheter into position, to push it directly into the opening, or to pick up any fold at the ureteral mouth by sliding the catheter along the floor.

In another case, the bladder was healthy, and there was no difficulty in entering the ureter with the point of the catheter, but, in pushing the catheter onwards, the mucus membrane became invaginated a little way, and then further progress was arrested. Both openings were too small to admit the finest catheter, although no disease was present in the bladder or ureters. These cases are related as illustrating difficulties in ureteral catheterization, but it must be remembered that they are exceptional.

An enlarged prostate may render the use of the ureteral catheter impracticable. This does not apply to all cases of enlargement, for a slightly enlarged organ, or one in which a small nodule projects into the bladder, need not interfere with the operation. Further, the number of cases of enlargement of the prostate, in which information of this nature is desired, is very small. A stricture of the urethra must be effectually treated before any means of urine separation can be adopted.

No general anæsthetic is required for the operation. The patients sometimes complain of a colicky pain, " a diarrhœa pain," one patient expressed it, on the side of the abdomen on which the catheter lies in the ureter. This pain, which is not severe, is due no doubt to ureteral spasm.

The fine lumen of the catheter may become blocked with clot. This rarely happens, but it is less easily remedied than is the accident in the case of the separator.

The catheters are easily damaged, and great care is necessary in using the "elevator," lest this injures the fine end of the instrument.

Danger of Ureteral Catheterization.—This is confined to the possible infection of the ureter, kidney pelvis and kidney, by the introduction of septic, or other material from the bladder, or upon the catheter from outside sources. Rather more has been heard of this danger than seems justified by the evidence upon which the statements have been based. The

ureteral catheters are too delicate to withstand prolonged boiling, but they may be washed with strong antiseptics, and, if carefully dried, will take no harm. They should be kept straight in a long glass tube, in which pellets of formalin are placed, and will thus lie in an atmosphere of formalin vapour. They should not be allowed to come in contact with the solid formalin, as this appears to erode their surface. This preparation has hitherto seemed to me to be efficient, and I have had no cases in which infection has taken place.

Professor Casper, with an experience of over 300 cases of ureteral catheterization, has not had a case of infection.

Damage to the ureteral opening results from want of skill on the part of the operator. The passage of the catheter is not, with the instruments at present in use, the cause of ecchymosis (Maitland) or of after-contraction, unless the operation is performed in an unskilful and hasty manner.

Fallacies of the Ureteral Catheter.—Some blood not infrequently results from the passage of the catheter. This does not always appear at the commencement of the flow, but may tinge the urine after the instrument has been in place for a minute or so. On pushing the catheter a short distance onwards the bleeding ceases. This hæmorrhage is a distinct disadvantage in the use of the ureteral catheter. It has never in my hands been severe, and I have always been able to collect urine free from blood in the cases, in which it occurred, by passing the catheter further in. It might however, lead to mistaken conclusions.

The urine not infrequently fails to flow for 20 or 30 seconds after the catheter has been laid in position. No conclusions can be drawn from this temporary oliguria, which may happen with a perfectly normal kidney.

Part of the urine, secreted by the kidney under observation, may escape alongside the catheter, and flow into the bladder. The urine may be seen welling up alongside the catheter at the ureteral opening. I do not think this occurs very frequently, especially if the catheter lie well up in the ureter. It must, however, be taken into account, if the amount of secretion is being investigated. The quantity of urine, secreted by one kidney in the short time during which the catheter is usually left in the ureter, is so

variable, and reacts to so many influences, that observations based upon it are, I believe, in any case open to misconstruction. The secretion of a very small amount of urine, which shows differences in composition from the urine of the other kidney, will of course receive due appreciation ; but minor differences in the quantities secreted cannot be looked upon as important.

It is only such minor differences, that the escape of some of the urine alongside the catheter will affect, and I look upon this fallacy as unimportant.

Urine Separation.—The difficulty in introducing the Luys instrument is undoubted, and is mentioned by all writers on the subject. This difficulty is encountered when the surgeon endeavours, by depressing the hilt, to make the curve of the instrument ride over the prostate. With practice the difficulty is to some extent overcome, but the statement ascribed to Professor Hartmann (Moynihan) that the instrument is easier to use in the male than in the female, can hardly apply to the introduction of the separator. This difficulty may lead to some bleeding, and, when the object of the separation is to make observations upon the presence or absence of blood in the urine, it is likely to be defeated.

No difficulty is experienced in introducing Cathelin's separator. An enlarged prostate precludes the use of Luys' separator, from the impossibility of introducing the instrument properly into the bladder. Nor is a well-marked intravesical prostatic enlargement likely to permit of accurate observations being made with the Cathelin instrument, for the ureters lie deeply behind these projections. The number of such cases, that require urine separation is, however, small. Without any appreciable enlargement of the prostate, a certain rigidity of the prostatic urethra and bladder neck may be present after previous inflammation. In these cases the difficulty in introducing Luys' instrument is considerable.

Bladder disease of any kind may render observations upon the separated urines worthless.

It is said that prolonged washing will render an inflamed bladder so clean that there is no contamination of the urine, and, again, that the urine only comes in contact with a small area of the bladder wall. Both these arguments are, however,

fallacious.   Every cystoscopist knows how impossible it may
be to wash a bladder clean, and how mucus and pus cling
to mucus membrane long after the fluid returns clear.   And
further, even a small area of diseased bladder wall may con-
taminate the small quantity of urine which is collected.   A
healthy bladder is even more necessary, in using the separators,
than in using the ureteral catheter.   A weak spot in the Luys'
instrument is the separability of the catheters.   The urine may
leak along the female urethra between the stem and the
catheters.   The small polished button point, which holds the
catheters and stem together, is difficult to adjust.   Blocking of
the catheters with clot may occur, and a piece of fine tubing
should be at hand, so that a syringe may be attached, and the
catheter washed clear.

Comparison of the Instruments.—I shall leave out of account
Kelly's method of catheterization of the female ureter.   To any
one accustomed to catheterize the male ureter the method is
abundantly simple in the female, and the one method will do
for both.

The uses of the catheter in the diagnosis of ureteral stone
and stricture, and the therapeutic use of the instrument need
not be discussed, for they do not come into a comparison with
the separator.

In comparing the instruments, it must be remembered, as
I have already pointed out, that the separator cannot be used
to replace the cystoscope, but in many cases must follow a
cystoscopy, if the information obtained is to be reliable.   Some
knowledge of cystoscopy is therefore necessary for the use of
the separator, and it is only a matter of practice to extend this
to the use of the ureteral catheter.   Catheterization of the
ureters undoubtedly requires skill, experience, and patience to
a greater degree than the separator; but these attributes cannot
be said to be superfluous in the application of the more recent
substitute.   In the most recent form of cystoscope, both
ureters may be drained simultaneously, which disposes of a very
important objection to the older instrument.

The danger of infection of a healthy ureter and kidney,
and damage from the passage of a catheter into the ureter,
are not accepted by those accustomed to the operation
as being practical objections.   The cases, suitable for one

method, are practically identical with those suitable for the other. The balance is slightly in favour of the separators, for certain states and positions of the ureteral orifice interfere with catheterization, while they do not affect the use of the separator. On the other hand, a bladder, in which the disease is confined to certain areas, allows of definite conclusions being drawn from catheterization, while the results of separation must be open to suspicion. The reliability of both forms of instrument has been repeatedly tested upon cases, in which the conditions of disease were known, or were afterwards proved by operation.

There remains for comparison the general applicability of the two methods, and in this the latest forms of separators are certainly greatly in advance of the ureter catheter. The latter instrument must at all times remain in the hands of a few surgeons, who have opportunities to acquire the necessary manipulative skill for its use. The separator is an instrument easier of application, and it will therefore appeal to a wider field of workers. The dangers of its use, apart from cystoscopy, have already been pointed out, and will probably become more evident as the method becomes more widely adopted.

I am unable to compare from my own experience the separators of Luys and Cathelin, for I have only worked with the former instrument. Nor does the literature on the subject provide any practical information. Moynihan believes that the Luys instrument will prove more workable in the female, and the Cathelin separator the best pattern for the male subject. As the expense of the instruments is considerable, and there are evident disadvantages in using different instruments in the two sexes, if one instrument can be applied to both, this prophecy does not appear to be likely to be fulfilled.

The ease of introduction of the Cathelin instrument in the male gives this instrument an undoubted advantage, and if it works equally well in the female, as is stated to be the case, there would be no need for an additional instrument.

LITERATURE.

Albarran : *Ann. d. mal. d. org. genito-urin*, 1891 ; *Rev. de Gynec. et de Chir. Abd.*, 1897.

Bickersteth: *Lancet*, March 26, 1904.

Casper : *Handb. d. Cystoskopie*, 1898 ; *Centralbl. f. Chir.*, 1895, No. 9.

Cathelin: *Assoc. Franc. d'urologie*, Paris, Oct. 1902, 1903, 19c4; *La Presse Méd.*, Nr. 48, Juin 14, 1902; *Gas. Hebd. de Méd.*, Paris, 1902, N.S., VII., 1193; *Ann. d. mal. d. org. génito-urin*, Paris, Juliet 1902, Juin 1903, Juin 1904; *Ann. de la Policlinique Centrale de Bruxelles*, Jan. 1904.

Le Dentu: *Bull. acad. de méd*, Paris, 1903, XLIX., 408.

Ebermann: Quoted *P. Müller, Deut. Med. Wochenschr.*, 1887, No. 31.

Emmet: Idem.

Fenwick: *Lancet*, 1886, Sept. 16.

Grünfeld: *Die Endoskopie der Harnröhre u. Blase*, 1881.

Guyon: *Ann. d. mal. d. org. génito-urin*, 1891, 744.

Hartmann: *Archiv. Internationales de Chir.*, VI. fasc. 2, 1903.

Hegar: *Ackiv. f. Gynaekologie*, 1886, B. XXVIII.

Harris: *N.Y. Med. Rec.*, Apr. 1898; *Jour. Amer. Med. Ass.*, 1898, 236; *Annals of Surgery*, 1900, 149.

Hock: *Prag. Med. Wochenschr.*, XXVIII., 40–42, 1903.

Hölscher: *Münch. Med. Wochenschr.*, 1897, Nr. 50.

Iverson: *Centralbl. f. Chir.*, 1888.

Kelly: *Operative Gynaecology; Med. News*, Nov. 1895; *Jour. Amer. Med. Ass.*, 17 Aug. 1895.

Keen: *Annals of Surgery*, May 1903.

Kelynack: *Renal Growths*, 1898.

Lambath: *Jour. de Méd. et de Chir. Brux.*, Sept. 1890.

Luys: *Assoc. Franc. d'urologie*, Paris, Oct. 1901; *Gas. hebdom. de Méd.*, Paris, 1902, N.S., VII. 1165; *Rev. de Gynéc et de Chir. Abd.*, Paris, 1903, VII., 85.

Lynn Thomas: *Brit. Med Jour.*, July 2, 1904.

Leguen et Cathelin: *Rev. de Gynéc. et de Chir. Abd.*, Paris, 190, VII.

Lower: *Med. News*, Dec. 19, 1903.

Morris: *Surgical Diseases of the Kidney and Ureter*, 1901.

Maitland: *Australian Med. Gas.*, May 20, 1902.

Moynihan: *Brit. Med. Journ.*, July 2, 1904.

Nitze: *Ann. d. mal. d. org. génito-urin*, Dec. 1891; *Diagnost. Lexicon. Wien.*, 1894, B. IV., 191; *Centralbl. f. Chir.*, 1895, No. 9.

Neumann: *Deut. Med. Wochenschr.*, Oct. 21, 1897.

Newman: *Glasgow Med. Journ.*, Aug. 1883.

Polk: *N.Y. Med. Journ.*, Feb. 1883.

Pawlick: *Wiener Med. Presse*, Oct. 1886; *Archiv. f. klin. Chir.*, 1888, B. 33.

Rafin: *Assoc. franc. d'urologie*, Oct. 1903.

Rochet et Pellanda: *Gas. hebd. de Med. et de Chir.*, Dec. 14, 1902.

Simon: *Volkmann's klin. Vorträge*, Nr. 88.

Sands: Quoted, *Müller, Deut. Med. Wochenschr.*, 1887, No. 31.

Silbermann: *Berlin. Klin. Wochenschr.*, 1883, No. 34.

Sänger: *Archiv. f. Gynaek*, 1886, B., 28.

Schulze: Quoted, *Casper, Handb. d. Cystoscopie.*

Tuchmann: *Deut. Zeitschr. f. Chir.*, V. 1875, VI. 1876; *Wiener Med. Wochenschr.* 1874, 31, 32.

Tilden Brown: *Annals of Surgery*, Dec. 1899.

Weir: Quoted, *Müller, Deut. Med. Wochenschr.*, 1887, No. 31.

Warkalla: *Archiv. f. Gynaek.*, B. 29, 1886.

Prize Essay.

THE CAUSES OF APPENDICITIS.

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THE causes of appendicitis have to be considered in several aspects : first, inquiry has to be made as to the varieties of micro-organisms which are found associated with the disease ; secondly, the question arises why this part of the bowel is more liable to inflammation than other parts, and what conditions of the appendix itself prepare the way for attacks ; and, thirdly, what are the predisposing conditions in the individual himself.

In the severer forms of the disease, associated with abscess or peritonitis, the micro-organisms present can be readily determined. In the pus, either within a suppurating appendix or in the abscess outside, many kinds of micro-organisms have been found ; that, which is most frequently present in appendix abscess, is the bacillus coli communis, and its growth is often the cause of the offensive smell of the pus. This bacillus, which is normally present in the intestine (and often in the appendix) in a harmless condition, may, in certain circumstances (to be considered later), become virulent, and may then be the cause of inflammation. It is accompanied sometimes by the streptococcus pyogenes, and some[1] have thought that this is in such cases the primary infection, the bacillus coli being secondary, but tending to "crowd out" the streptococcus. From the well-known tendency, however, of the bacillus coli to become virulent, and from its being frequently the only microbe present, it would seem that it is the actual cause of many cases of appendicitis.

The streptococcus, too, is a frequent cause, for, in cases where the pus has no offensive smell, it is often obtained as a pure culture. In a few such cases, examined by the writer, it has always been present.

The following micro-organisms have also, though less often, been found : the staphylococcus pyogenes aureus and citreus,

pneumococcus, the bacillus pyocyaneus, proteus, and various anaerobic and putrefactive bacilli, as have also the bacilli of influenza, diphtheria, glanders, and tetanus.

Actinomycosis is a rare cause of appendicitis. Tubercular ulcers may occur in the appendix; but in all cases, save one, they have been also present elsewhere in the intestine. Typhoid ulcers may also occur in the appendix, and have led to its perforation in several cases.

It is probable that all attacks of true appendicitis are due to the action of bacteria, and that the severity of the disease, whether it be catarrhal or suppurative, resulting in a local abscess, or in general peritonitis, depends upon the virulence of the infecting microbe, and upon the resisting powers of the individual.

In the next place, it is necessary to consider what conditions make the appendix more liable to attack by micro-organisms than the rest of the bowel. The mucous membrane of the appendix contains, besides Lieberkuhn's follicles, a large number of Peyer's patches, and the great amount of lymphoid tissue has caused the name of abdominal tonsil to be given to it. This tissue is especially abundant before 30 years of age ; its function is to destroy invading microbes, but if the virulence of these is too great, it is in its turn destroyed by them with the formation of pus ; and as the tonsil is liable to inflammation, set up by micro-organisms, so is the appendix; this liability has been shown experimentally by appendicitis having resulted from the injection of microbes into the blood stream : by it having occurred at the same time as tonsilitis, the same streptococcus being found in both situations ; and by epidemics of appendi-citis having been described. The abundance of lymphoid tissue is then one factor in the production of appendicitis ; another factor is that the bacterial activity is at its maximum in the cæcum, indeed the presence of so many Peyer's patches probably shows the necessity for this activity being inhibited ; the contents of the cæcum are fully digested and also semi-fluid, both of which conditions are favourable to microbial growth.

Some cases of appendicitis seem to depend, not on any previous diseased condition of the appendix, but entirely on its liability to inflammation, and on the presence of virulent micro-organisms ; thus a boy, aged 14, had three attacks of

appendicitis within two weeks, not ending in formation of pus; the appendix was removed, its lumen was patent throughout, a little fluid fæcal matter being present, there was no stricture, ulcer, or concretion, and the only abnormality visible was a number of ecchymoses, presumably the result of recent inflammation.

In many cases, however, gross lesions are found which have been contributing causes to the attack; these are concretions, ulcers, narrowing of the lumen at one point, such conditions being present either singly or together. Now a narrowing of the lumen at one spot, by preventing drainage, may cause the formation of a culture tube, favourable to the growth of bacteria, and this alone may produce an increase of their virulence, especially in the case of the bacillus coli communis. Ligature of the appendix in rabbits has caused mucopus to form, thus showing that a closed sac favours microbial activity. Concretions again undoubtedly exert a decided influence in the production of appendicitis; thus in 100 ordinary autopsies there were concretions in 5 per cent.; in 100 cases of appendicitis they were present in 30 to 50 per cent. (Hawkins). They may exert this influence, by blocking up the lumen and so diminishing drainage, or by their presence causing catarrh or ulceration. It is to be noted, however, that where a concretion and ulcer co-exist, the latter is not always caused by the former, for the two may be in entirely distinct positions. When concretion and stricture occur together, two explanations of the condition have been given : one is that the concretion set up catarrh, and so brought about thickening of the appendix and consequent narrowing of the lumen : the other is, that the catarrh was the primary factor, and both stricture and concretion were due to this: that the latter is probably the true explanation is shown by the following considerations :— The concretions are composed of salts of lime and magnesium, with inspissated masses of bacteria and a little fæcal matter : rhinoliths also composed of inorganic salts are (as pointed out by Sir F. Treves) [2] produced by chronic nasal catarrh, and this analogy makes it probable that these appendix concretions are produced by chronic catarrh : the analogy of gall-stones is also in favour of this hypothesis, for these have been shown to be formed as the result of catarrh of the gall bladder, brought

about by the invasion of bacteria. That the concretions are
formed in the appendix, and do not enter from the cæcum,
is evident from their cylindrical shape, and their size, which is
often greater than the lumen of the normal appendix. It
would seem, therefore, that chronic catarrh of the appendix
leading to concretion and stricture, and sometimes also to
ulceration, is one of the important predisposing causes to
acute appendicitis, the invasion by virulent micro-organisms
being rendered easier by these conditions.

True foreign bodies are only rarely the cause of appendi-
citis, the frequency, with which they have been found in
operations, being estimated by Sir F. Treves at 3 per cent.,[3]
though others have placed the percentage as high as 12 :
moreover, they have been found after death lying in a normal
appendix and having caused no injury.

The appendix may be kinked, bent at an angle, or twisted
around its long axis, these conditions being produced either by
adhesions, or by shortness of the peritoneal folds attached to
the organ. The same effects may be produced as by a stricture,
the closed sac favouring microbial growth, and an accumulation
of pus or mucopus.

It has thus far been shown to what extent the structure of
the appendix, its position near the cæcum, and unhealthy con-
ditions of the organ are contributing factors in the production
of appendicitis, and it remains now to consider what conditions
in the individual predispose to an acute attack, and to the pro-
duction of that chronic catarrh, which has been seen to be such
an important contributing factor in some cases.

It seems to be well established that, not only is appendicitis
more frequently recognised now than formerly, but that it is
of commoner occurrence. This has been ascribed to several
of the modern conditions of life : to constipation, the use of
purgatives, indigestion, bad teeth, and the uric acid diathesis.

Now appendicitis is three or four times more common in
men than in women, though the latter suffer more from con-
stipation, and take more purgatives : these two habits do not,
therefore, seem to produce the disease.

Sir F. Treves[4] considers that the most important factor in
its production is the presence of masses of undigested food in
the cæcum, these being liable to decompose and so to set up

catarrh. This view is based on the following facts :—Patients suffering from appendicitis often have bad teeth, and the food is therefore bolted without being masticated : many of them are subjects of chronic indigestion, and they are often aware that an aggravation of the indigestion may precede an attack : commercial travellers and holiday makers, having often to eat their meals hurriedly, are very prone to the disease, and hurried eating is perhaps more common with men than women. An indigestible meal often immediately precedes an attack, and nuts, cheese, turnips, mussels, and other articles have been found unchanged, and undigested in the motions. Undigested masses of food may therefore be an immediate cause of an acute attack, and also may be a cause of chronic catarrh, which is a prominent predisposing cause. Bad teeth may also favour appendicitis in another way, namely, by causing a large number of micro-organisms (those of suppuration amongst the number) to be swallowed, which may find a nidus of growth in the appendix.

It has been suggested by Haig that the uric acid diathesis is a cause of appendicitis, mainly because he believes that salicylates act favourably on an attack : this beneficial action may be, however, explained by their antiseptic action on the contents of the bowel. The action of salicylates is, similarly, not of value as an argument that appendicitis may be rheumatic : there have, however, been cases described where appendicitis has been associated with polyarthritis acuta, and it is possible that the active micro-organism, in such cases, may be the coccus, which probably is the cause of rheumatic fever.

The greater freedom from attack in the case of women (the proportion between boys and girls being apparently the same as between men and women [*]) has been thought to be due to the additional blood supply from the ovarian artery. In old men it is possible that endarteritis may favour the production of a gangrenous appendix.

The liability of children to the disease must also be taken into consideration, for the heaviest incidence—40 per cent. of the total—of the disease, falls between the 10th and 20th years ; this may be partly owing to the larger amount of lymphoid tissue in the appendix during the earlier years of

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life ; but children also are specially prone to catarrh of the bowels, sometimes acute and accompanied by fever (popularly called a cold on the stomach or liver), sometimes chronic and lasting several weeks or months. It is possible that attacks, similar to the former, may at times infect the appendix and cause an attack of appendicitis ; and the more chronic attacks may also cause a chronic catarrh of the appendix, leading to concretions, which are frequently found present in children, some say more commonly than in later life. Many of these attacks are probably of bacterial origin, though others are probably due to undigested food, for a history of quick eating, and the presence of bad teeth are commonly present. The improper food given to children, and perhaps especially new bread, which is very difficult to masticate, cannot be held free from blame.

Finally, mention may be made of the fact that several members of a family sometimes suffer from appendicitis, thus showing a special liability to the affection.

REFERENCES.

[1] *Twentieth Century Practice of Medicine*, Vol. IX., p. 157.
[2] Allbutt's *System of Medicine*, Vol. III., p. 884.
[3] *Ibid.*, p. 886.
[4] *Ibid.*, p. 884.
[5] *Twentieth Century Practice of Medicine*, Vol. VIII., p. 454.

THE CAUSATION AND TREATMENT OF APPENDICITIS.[1]

By JAMES SHERREN, F.R.C.S. (ENG.),

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GENTLEMEN,

In looking through some of the recent papers on appendicitis, I found that, although the death rate given by different observers varied within wide limits, from two per cent. (Morris) to forty per cent. (With),[2] three of the largest hospitals in the United Kingdom, during the years 1892 to 1895, agreed in a death rate of from twenty to twenty-five per cent. The death rate of the cases of acute appendicitis treated at the London Hospital, during the years 1892 to 1903 inclusive, varied between seventeen and twenty-three per cent., with a mean of nineteen and a half per cent. I have included under " acute appendicitis " all cases admitted during an attack. Until the year 1898, cases appeared in the Hospital Register under the headings of typhlitis and peri-typhlitis, since that date all cases have been indexed as appendicitis. I have included in the figures, for the years previous to 1898, all the cases that now would be diagnosed as appendicitis. During these years, a great increase has taken place in the number of cases of this disease treated at the London Hospital. In 1892, 21 cases were treated ; in 1903, 268. The increase in the total number of cases, admitted to the hospital in this period, is not quite one-third (9,409 in 1892, 12,460 in 1903).

These are the reasons that have led me to bring this subject before you for discussion this evening.

Inflammation of the appendix is caused by the action of micro-organisms on an appendix made vulnerable by causes we shall consider later. It was taught for long that the offending micro-organism was the colon bacillus. It was found in the majority of cases of suppuration in connection with the

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[1] An address delivered before the Wood Green and District Medical Society.
[2] MacDougall : Quoted by Tubby and Jacobson.

appendix, usually in a pure culture. Opinion on this point in many quarters has of late undergone a change. Other bacteria have been considered to be the cause. A bacillus, thought to be that of influenza, has been found. Jensen [1] looks upon the pneumococcus, or an organism resembling it, as the cause. Corner,[2] in his Erasmus Wilson lectures, points out the frequency with which other pyogenic organisms are present in acute cases, and considers that a staphylococcus is the micro-organism concerned in the majority of cases of acute appendicitis.

We must now pass on to the second factor, the lowered resistance. Several writers, in recent years, have compared the causation of inflammation of the appendix to that of the gall and urinary bladders. They have pointed out that obstruction to the outflow of fluid is an important factor in the causation ot inflammation in these hollow viscera. But it is only lately that stress has been laid upon this. Interference with the blood supply of the appendix is the most common cause ot the lowered resistance, and is due in many cases to increased tension within the appendix.

In a paper on cutaneous hyperalgesia in appendicitis,[3] I pointed out the occurrence of this increased tension. In acute appendicitis, it is due in most cases to obstruction of the opening of the appendix into the cæcum. This orifice is small, not uncommonly smaller than the lumen of the appendix, is hidden beneath folds of mucous membrane, and guarded in from thirty to forty per cent. of cases by a valvular fold of mucous membrane, the valve of Gerlach. Swelling of the mucous membrane at this opening such as may be produced in typhlitis ; or obstruction, the result of distension of the cæcum, is the cause of the increased tension in many cases. Russell [4] looks upon swelling of the mucous membrane of the cæcum as a causal factor in appendicitis. Van Zwalenberg,[5] approaching the subject from the experimental side, found that on raising the tension within the appendix of a dog, by the injection of

[1] v. Langenbeck's *Archives*, Bd. LXIX. u. LXX.·
[2] *Lancet*, May 28, 1904.
[3] *Lancet*, September 19. 1903.
[4] *Lancet*, March 19, 1904.
[5] *Journal American Med. Assoc.*, March, 1904.

fluid, inflammation was produced when the pressure was equal to that of the blood in its vessels. He suggests that a concretion may play a part in the production of increased tension by acting as a ball valve. He demonstrated this ball valve action on an excised appendix containing a concretion, and considers this may be the cause, in some cases, of the onset of an attack after injury, fluid being forced into the appendix by compression of the cæcum. Von Hansemann [1] also lays stress on this raised tension as a factor in the production of inflammation of the appendix, and considers that the valve of Gerlach may aid in its production. He found obstruction of the orifice of the appendix in 18 out of 19 cases of acute appendicitis that died without operation. I have found that operation, while cutaneous tenderness is present, invariably reveals a distended appendix. But obstruction of the opening of the appendix into the cæcum is not the only way by which the pressure within the appendix may be raised. The obstruction may occur at a stricture, left after a previous attack, or produced as the result of chronic appendicitis. This stricture may become completely closed by swelling of mucous membrane, or, if completely closed, infection of the contents of the appendix distal to the stricture may precipitate an attack.

In inflammation occurring in the infantile type of appendix, it is difficult to imagine increased tension within it as the result of obstruction of its opening into the cæcum. In these, and perhaps in other cases, injury to its mucous membrane from irritation of the products of cæcal indigestion, or bacterial growth, may be the immediate predisposing cause of the attack. It is of interest in this connection that the only case of acute appendicitis, I have operated upon or seen operated upon by others, in which before operation no cutaneous tenderness was present, and at the operation the appendix was neither gangrenous nor perforated, occurred in a patient with infantile type of appendix. The whole or part of the blood supply of the appendix may be cut off as the result of kinking of the appendix; this may be the cause of the lowered resistance in other cases.

Neither the presence of bacteria nor lowered resistance is

[1] *Cent. f. Chirurgie,* May 21, 1904,

sufficient alone to cause an attack. Bacteria are normal inhabitants of the large intestine. Van Zwalenberg[1] failed to produce inflammation by introducing bacteria into the appendix of a dog. The tension within the appendix may be raised without causing an attack of appendicitis ; this is seen in the condition known as appendicular colic, and in some cases of chronic appendicitis with a stricture. In the former, the symptoms are due to the increased tension within the appendix, the stimulation of the nerve endings bringing out the reflected pain, accompanied, in many cases, by cutaneous hyperalgesia : no peritonitis is present in this condition. In chronic appendicitis with stricture, reflected pain and cutaneous tenderness are not uncommonly seen without any sign of recent inflammation. In cases such as these, the appropriate micro-organism may not be present, or present in insufficient number or virulence ; or the tension not sufficiently high, or suddenly raised, to cause interference with the blood supply.

I have tried to point out to you that appendicitis is due to the action of bacteria upon a vulnerable appendix ; that this vulnerability is brought about in most cases by interference with its blood supply, the result of increased tension within it, and that this increased tension is due to obstruction of its opening into the cæcum, due in some cases to distension of the cæcum, in others to swelling of the mucous membrane, the result of inflammation. In both these groups the immediate cause lies in the cæcum.

That appendicitis has increased of recent years is by no means the universal opinion. Mayo Robson[2] remarks : " The disease is said to be on the increase, but I am not at all sure as to the truth of this . . . ." He considers that the increase may be apparent, and due to increased accuracy of diagnosis. One of the most widely read of the text-books of surgery[3] says that there is no positive proof of its increase. Increased accuracy of diagnosis will not account for the extraordinary increase of cases of suppuration in the right iliac fossa, due to disease of the appendix ; these cases were recognised in 1892. Peritonitis from perforation of the appendix was also well

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[1] *Loc. cit.*
[2] *Lancet*, August 1, 1903.
[3] Walsham-Spencer.

recognised, yet more cases of peritonitis from perforation of the appendix were operated upon at the London Hospital, in 1903, than all the cases of appendicitis treated there in 1892. This increase has been, with one exception, continuous. In 1900, two cases less were treated than in 1899. But though continuous, it has not been regular : several years have been marked by large increase. In 1893, there was an increase of 34 cases over the 21 of the year before, in 1899, of 31 over the 133 of 1898, and in 1903, of 40 over 228 (*vide* Table I.). This
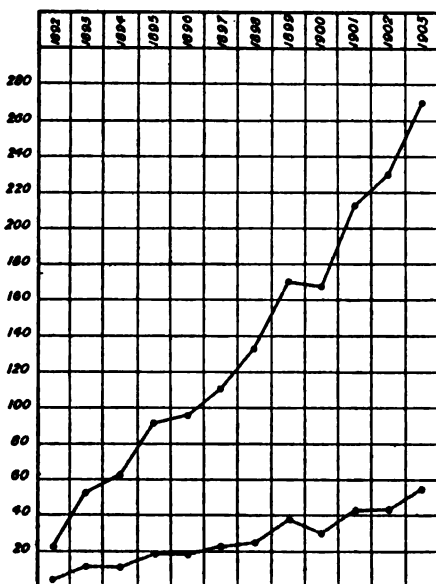
Table i. *To show fluctuations in the increase of the number of cases of appendicitis under treatment and in the mortality.*

Continuous line represents cases of appendicitis under treatment. Interrupted line represents number of deaths.

increase has not been confined to the London Hospital or to England. Coombe,[1] Clayton Greene,[2] Barling,[3] all speak of its increase in this country. Marvel[4] gives the number of cases treated at the Pennsylvania Hospital over a period of years somewhat longer than I have taken. His tables give an

[1] *Lancet*, June 4, 1904.
[2] *Lancet*, May 14, 1904.
[3] *Brit. Med. Journ.*, January, 1903.
[4] *Journ. Amer. Med. Assoc.*, July, 1904.

increase greater than in those, I have compiled from the London Hospital, and showing similiar fluctuations. It must be admitted, I think, that after allowing for increased accuracy of diagnosis, and for the larger number of cases, sent to hospitals to be under the care of the surgeon, there is still an increase to be accounted for.

It is worth remark, that the fluctuation in the number of deaths does not correspond to the fluctuation in the increase
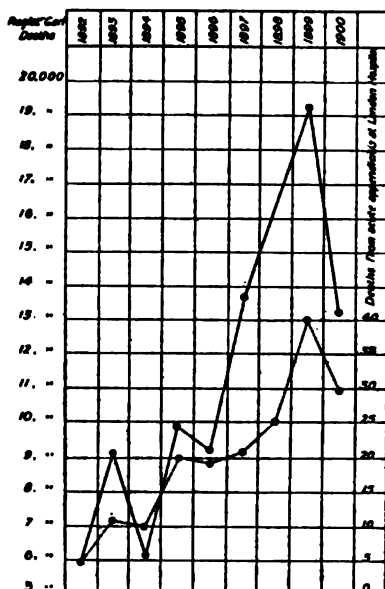
Table 2. *Showing relation between the number of deaths from certain abdominal diseases compiled from the Registrar-General's Report for* 1901, *and the deaths from acute appendicitis in the, London Hospital.*

Continuous line represents deaths from abdominal diseases. Interrupted line deaths from acute appendicitis.

of the disease, and the curves of increase do not correspond. (*Vide* Table I.) That this was not a local fluctuation is suggested by the accompanying table compiled from the Registrar-General's Report for 1901. Unfortunately, appendicitis, typhlitis, peri-typhlitis, enteritis, and gastro-enteritis are grouped together, so that the table only gives the relationship to certain inflammatory abdominal diseases. I have only

compared up to the year 1900; since this date the two latter have been tabulated separately. It will be seen that the greatest number of deaths from these diseases occurred in the years, in which the greatest number of deaths from appendicitis occurred at the London Hospital, and the curves correspond almost exactly. In other words, not only is this disease on the increase, but it varies in severity from year to year (*vide also* Table IV.).

In discussing the cause of this disease, we must bear these facts in mind. We have to consider what are the causes which lead to digestive disturbances in the cæcum, and the reasons of their increase. The increase in the number of cases
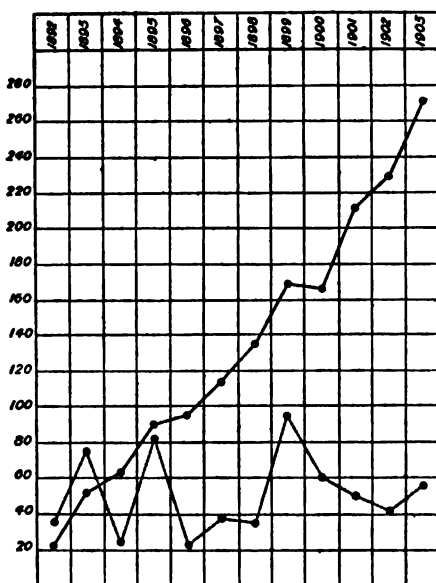
Table 3. *To show relation between number of cases of acute appendicitis and of influenza under treatment at the London Hospital.*

Continuous line represents acute appendicitis. Interrupted line represents influenza.

of appendicitis treated at the London Hospital has affected both sexes equally, the proportion of males to females attacked has remained the same through all its fluctuations, 2·5 males to 1 female. The cause must, therefore, be one that affects

both sexes equally. Injury, cycling, the rush of modern life, causes given by various writers, certainly do not do this. We must look, I think, to dietetic causes, or to the increase of other inflammatory abdominal diseases.

Whether the increasing consumption of chilled and frozen meat, and of the much-advertised partly cooked cereal foods, plays any part in the production of this increase is, I think, worth considering. Influenza is thought by some writers to play a part. Marvel [1] considers that it has much to do with the increase of the disease, and he is supported in his contention by some of the well-known American surgeons. He mentions that appendicitis is particularly prevalent in those States in which influenza is most rife. That influenza can be blamed for the whole of this increase is, to my mind, extremely doubtful; that it has some share in the production of the peculiar fluctuations in the increase is, I think, more than probable.

In order to see what relationship existed between the number of cases of appendicitis and influenza under treatment at the London Hospital, I drew up the accompanying table. I have not gone to the Registrar-General's Report, as I wished to compare cases drawn from the same area. From this table it is seen that the number of cases of influenza under treatment has not increased with that of appendicitis; but, with one exception, the years of greatest increase of appendicitis were those in which the greatest number of cases of influenza were under treatment (1893, 1895, 1899, 1903), *vide* Table III.

This is suggestive of direct relationship, for the steady increase, other causes of intestinal disturbance are responsible. A much greater correspondence exists between the number of cases of influenza under treatment, and the death rate of appendicitis. The year with the greatest death rate for appendicitis, 1899, is the year in which the largest number of cases of influenza were under treatment (*vide* Table IV.).

There are some cases of inflammation of the appendix, that do not appear to be caused by interference with its blood supply as the result of increased tension. Some of these cases arise in connection with injury. Injury plays little part in the production of first attacks of this disease, but the suggestion

[1] *Loc. cit.*

of Van Zwalenberg [1] may be true in some cases ; in others the blood supply may be interfered with by kinking. In attacks subsequent to the first, injury plays a greater part. In these cases a stricture is usually present, and the injury may deter-
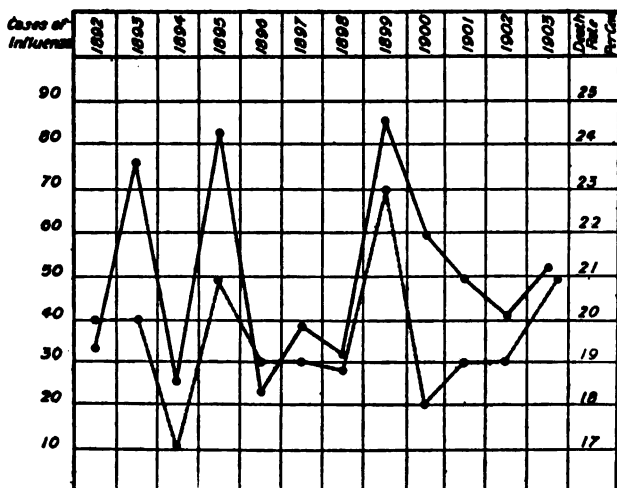
Table 4. *To show relation between the death-rate of acute appendicitis and the number of cases of influenza under treatment at the London Hospital.*

Continuous line represents number of cases of influenza under treatment.
Interrupted line represents death-rate of acute appendicitis.

mine the attack by causing rupture of the dilated portion of the appendix distal to the stricture.

There is one other point in connection with this disease, that has never been adequately explained, the sex incidence. That it is due to some fundamental difference in the cæcum, or appendix of the two sexes, is at least suggested by the remarkable way in which the ratio between the number of males and females attacked has remained constant. It is said by some to be due to difference in blood supply, that the appendix in the female receives an additional artery from the ovarian. Birmingham [2] has failed to find it. Even were it a constant feature it would explain nothing, for the cases of appendicitis, due to interference with the blood supply of the

[1] *Loc. cit.*
[2] Cunningham: *Text Book of Anatomy.*

appendix from blockage of the trunk of the appendicular artery, are small ; in most cases the interference is from within, and would act equally on branches from the additional source. I am able to offer no suggestion other than the above for this difference in the attack rate.

We have now to consider the treatment of this disease. All will agree that a hospital death rate of nearly 20 per cent. points to the need of change in our treatment. The ratio between the cases, treated by operation, and those treated medically rises each year, yet no corresponding diminution has taken place in the death rate. This points to an increase in the severity of the disease.

The only way, in which this death rate can be reduced, is by early operation. There is no curative medical treatment. That a large percentage of cases get over the attack without surgical aid is true ; but a large number of these cases relapse. Sir Frederick Treves, in his Cavendish lecture, said : " I am quite certain that it is safe to say that nowadays the great majority of cases will relapse." [1]

All definite cases of appendicitis should be treated by removal of the appendix ; the difficulty arises in deciding when this should be done. If we are able to see a case within the first 24 or 36 hours, when the disease is probably limited to the appendix, operation should be performed and the appendix removed. Often drainage is not necessary, and the abdomen can be opened in such a way as to avoid the occurrence of a ventral hernia. Not only do we save life by the early operation, we lessen the time that the patient has to remain away from his daily duties. If this were the routine treatment, the death rate should not be more than 2 per cent. Jacobson[2] thinks that it may be as high as 8 per cent., but considers this would be a great improvement on our present mortality. Whether this improvement is ever reached depends on the practitioner in a large measure, surgeons can do little towards educating the public to a right view of this disease, and are entirely dependent on the practitioner as to the time at which they are able to see these cases.

After the most favourable time has passed, I am strongly

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[1] *Lancet*, June 28, 1902.
[2] Jacobson and Steward: *Observations o Surgery*.

of the opinion that, if possible, we should wait until the attack is over. We must now put on one side all question of days of disease ; it has been said that operation should never be performed on certain days of the disease. We must operate whenever operation is indicated.

There are, then, the two groups of cases : those coming under observation in the first 36 hours of the disease, when the appendix should be removed ; those seen later ; these should be tided over the attack, if possible, and the appendix removed later. Unfortunately the number of cases in this last group is all too small.

The most difficult part of our task is to settle which cases of this second group need operation. Personally, if I am in doubt, I operate, and have never regretted it, although I have regretted leaving a case. All cases, that are not markedly improving, should be operated upon, no matter what stage of the disease they are in. In this connection, I would draw your attention to the significance of cutaneous tenderness. The points are briefly these. Two varieties of tenderness are met with in appendicitis, the superficial or skin tenderness and the deep. The superficial is brought out by gently stroking or picking up the skin. It usually occupies a triangular area on the right side of the abdomen, which I described as " the appendix triangle," bounded below by Poupart's ligament, above by a line drawn out from the umbilicus, and to the inner side by a vertical line just to the right of the mid-line. Its apex is at the anterior superior spine. Sometimes the tenderness occupies an area, passing round the body as a band, at the level of Head's 11th dorsal area. The " triangle " is the anterior part of this area. In cases that are quieting down, the triangle often becomes smaller and smaller, sometimes leaving a rounded area of tenderness midway between the anterior superior spine and the umbilicus. This superficial tenderness is due to stimulation of the nerves in the appendix, the result of the tension within it, and is a valuable sign that the appendix is not gangrenous or perforated. It is the only sign that 1 know.

Disappearance of superficial tenderness, without evidence of improvement in the general condition of the patient, calls for immediate operation. If a case comes under observation later

than the first period, with superficial tenderness, we should watch the case, being ready to operate, if necessary, on its disappearance. It must not be considered, however, that the presence of superficial tenderness is a sign of safety. The inflammation may spread outside the appendix, and an abscess form, without leading to any diminution of the tension within it. This occurs usually about the third or fourth day, and a rising pulse rate and temperature should make us operate. If a case comes under our observation early in the attack, and no superficial tenderness is present, operation should be performed unless the patient is obviously improving.

There are the cases that come under observation late, with a swelling in the right side of the abdomen without superficial tenderness. They are usually seen from the eighth day onwards, sometimes after an attack which was not of sufficient severity to compel the patient to seek medical advice. These late swellings are always abscesses; the pus should be evacuated, and the appendix removed if possible. Removal of the appendix ensures that the patient is free from another attack, and the wound heals much more rapidly.

To sum up in a few words. The ideal treatment is to remove the appendix during the first 24 or 36 hours of an attack, if this is impossible, expectant treatment should be adopted, being ready to operate if the patient does not steadily improve. If operation is not indicated during the attack, the appendix should be removed in the interval.

BRITISH HEALTH RESORTS.

I.—HARROGATE.

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Honorary Physician to the Yorkshire Home for Incurable and Chronic Diseases, Harrogate.

[With Plates XLV.—L.]

OF recent years increasing consideration has been given by the medical profession to the question of balneo therapeutics. In this article, it is proposed to give some account of the natural mineral water resources and baths of Harrogate. Situated on a moorland plateau, at an altitude of from 400 to 600 feet above the sea level, equidistant from the east and west coasts, Harrogate possesses a dry and bracing climate and an atmosphere, which is remarkably invigorating and free from the pollution of smoke.

The Mineral Waters.—In Harrogate and district there are upwards of 80 known springs, all of which differ from one another in one or more particulars. The following features, however, are common. They are all alkaline in reaction, non-thermal, and contain a greater or less amount of saline ingredients.

The waters, which are most frequently employed in internal administration, may, for purposes of classification, be conveniently divided into two groups :—

A.—*Sulphur Waters.*

(1.) Strong Saline Sulphur.
      Strong Sulphur (Old Sulphur Well).
      Strong Montpellier (Royal Baths Pump Room).

(2.) Mild Saline Sulphur.
      Mild Sulphur (Old Sulphur Well).
      Magnesia (Old Sulphur Well).
      No. 36 (Valley Gardens Pump Room).

(3.) Alkaline Sulphur.
      Harlow Car (at Harlow Car).
      Beckwith (Old Sulphur Well).
      Starbeck (Royal Baths Pump Room).

B.—*Iron Waters.*

(1.) Saline Chalybeate :
      Kissingen (Royal Baths Pump Room).

Chloride of Iron (Royal Baths Pump Room).
Alexandra (Royal Baths Pump Room).
(2.) Pure Chalybeate :
Carbonate of Iron (Royal Baths Pump Room).
Tewit Spring (Stray).
Harrogate Pure Chalybeate (Old Sulphur Well).

I herewith append the most recent analyses of the waters :—

Saline Constituents in Grains per Gallon.	Old Sulphur Well Royal Pump Room (Thorpe).	Strong Sulphur Mont-pellier (Attfield).	New or Mild Sulphur, Royal Pump Room (W. A. Miller).	Mild Sulphur Mont-pellier (Attfield).	Magnesia (Mus-pratt).	Starbeck Spa (Fairley).
Sodium Sulphydrate	5·215	—	6·89	—	—	—
Sodium Sulphide	—	14·500	—	8·777	·707	1·515
Barium Chloride	6·566	—	trace	—	1·222	trace
Strontium Chloride	trace	2·816	—	6·19	trace	—
Calcium Chloride	43·635	79·936	16·70	31·296	—	—
Magnesium Chloride	48·281	57·989	2·39	27·589	1·792	—
Potassium Chloride	9·592	4·811	11·34	5·691	27·913	—
Lithium Chloride	·753	trace	trace	—	trace	0·070
Ammonium Chloride	1·031	·996	—	·656	trace	trace
Ammonium Carbonate	—	—	—	—	—	0·225
Sodium Chloride	893·670	847·371	582·95	388·800	215·896	109·890
Sodium Silicate	—	—	—	—	—	2·073
Magnesium Bromide	2·283	—	—	—	trace	trace
Magnesium Iodide	·113	—	—	—	trace	trace
Calcium Carbonate	29·768	8·750	—	16·711	18·476	7·825
Magnesium Carbonate	5·953	—	—	—	12·799	4·119
Ferrous Carbonate	—	—	—	—	—	0·072
Potassium Carbonate	—	—	—	—	—	1·745
Sodium Carbonate	—	—	—	—	—	17·104
Sodium Iodide	—	—	—	—	—	0·091
Barium Sulphate	—	·418	—	—	—	—
Barium Carbonate	—	—	—	—	—	2·275
Strontium Sulphate	—	·529	—	·913	—	—
Strontium Carbonate	—	—	—	—	—	0·141
Calcium Sulphate	—	—	—	—	—	1·88
Sodium Nitrate	—	·900	—	·370	—	—
Silica	·701	3·570	·240	3·836	1·606	3·27
	1047·561	1002·586	654·87	485·258	280·413	151·39

PLATE XLV.

[Photocrom Co

The Stray, from Low Harrogate.

PLATE XLVI.

Royal Pump Room (Old Sulphur Well).

Saline Constituents in Grains per Gallon.	Kissingen Spa (Attfield).	Chloride of Iron Spa (Thorpe).	Alexandra Chalybeate (Davis).	Carbonate of Iron Spa (Muspratt).	Pure Chalybeate Royal Pump (Davis).	Tewit Well (Hofmann).
Ferrous Chloride	—	13·213	—	—	—	—
Ferrous Carbonate	9·590	11·050	5·800	6·042	1·364	1·358
Ferrous Sulphate	—	—	—	—	—	—
Ferric Sulphate	—	—	—	—	—	—
Aluminium Sulphate	—	—	—	—	—	—
Calcium Sulphate	—	—	9·097	7·625	·740	·697
Magnesium Sulphate	—	—	—	—	—	—
Potassium Sulphate	—	—	—	—	—	—
Ammonium Sulphate	—	—	—	—	—	—
Barium Sulphate	·509	·222	—	—	—	—
Potassium Chloride	21·425	3·205	1·130	·150	—	1·323
Sodium Chloride	674·598	277·561	176·370	11·650	1·625	·280
Ammonium Chloride	·439	·406	trace	—	trace	trace
Barium	—	5·204	—	—	—	—
Strontium Chloride	·887	·624	—	—	—	—
Calcium Chloride	87·337	94·015	—	2·311	—	—
Manganese Chloride	—	·971	trace	—	trace	trace
Magnesium Chloride	65·391	57·315	4·736	13·148	—	—
Lithium, Iodides, Bromides, Fluordides.	traces	traces	traces	—	trace	trace
Barium Carbonate	2·136	—	—	—	—	—
Calcium Carbonate	8·858	—	13·762	·341	1·532	1·435
Magnesium Carbonate	—	—	5·785	—	1·952	2·667
Potassium Carbonate	—	—	—	—	·262	1·057
Sodium Carbonate	—	—	—	—	1·103	—
Silica	3·570	1·414	·675	·204	·502	1·041
Organic Matter	—	—	1·450	—	·750	·063
	874·740	465·200	218·804	41·471	9·839	10·521

It will be noted that, in the sulphur waters, the sulphur is present in the form of an alkaline sulphide, and an important feature is the absence of the sulphate which is present in the form of calcium sulphate in many sulphur spas.

Of the chalybeate waters, the one most commonly prescribed is the Kissingen, in which iron and barium are present in the form of the carbonate. It contains a large proportion of the chlorides of sodium, calcium, magnesium, and potassium. Comparing the chloride of iron spring with the Kissingen, the

former contains twice as much iron (ferrous chloride and carbonate), but only half the quantity of saline chlorides.

The water from the Harlow Car Spring is similar in chemical composition to the Starbeck Spa, an analysis of which is given.

Baths.—The two most important bathing establishments are the Royal Baths, which were erected in 1897, at a cost of £120,000, and the Victoria Baths. These, together with the baths at Starbeck, are under the control of the corporation. Baths of Harlow Car Water can also be obtained at Harlow Car, one mile away from the town. They are under private management.

The following is a list of baths administered at one or other of the bathing establishments :—Sulphur Immersion Baths— Strong, Mild, Beckwith, Starbeck, Harlow Car; Electric Sulphur, Electric Plain ; Harrogate Massage Douche, Vichy Douche, Needle and Shower Baths, Brine Baths, Peat Baths, Vapour Baths, Berthe, Bertholet (local steam), Liver Packs, Nauheim Baths, Greville, Dowsing, D'Arsonval High Frequency Applications, Electric Light, and Ozone, and Plombière.

Therapeutic Indications.—It must be remembered that the efficacy of spa treatment depends, to a certain extent only, on the composition and character of the waters, but that the change of air and scene, combined with a regulated mode of life and diet, are most important factors. At the same time there is a considerable amount of clinical evidence, which goes to prove that, in certain morbid conditions, marked benefit is derived from a course of waters and baths at Harrogate, judiciously administered.

Speaking generally, they are of great service in aiding the adequate elimination of waste products by the bowels, kidneys, and skin. Thus, the strong sulphur water, which is commonly drunk hot before breakfast in doses of from 15 to 25 ounces, has a laxative action, owing to the large amount of saline constituents which it contains. Further, as Bain [1] has shown, this water is one of the most powerful cholagogues which we have at our disposal, increasing the amount of both bile and bile solids.

Now that so much importance is rightly attached to the question of toxæmic conditions, originating from morbid fermentative and other changes, occurring in the metabolic process of

PLATE XLVII.

Royal Baths.

PLATE XLVIII.

[Photocrom Co.

Royal Baths : Winter Gardens.

gastro-intestinal digestion, the benefit of such a course of treatment is obvious, and particularly is this so, when it is combined with the administration of a course of one or other of the magnesia waters (which are diuretic in action), and some form of bath treatment, the latter promoting and stimulating the excretory and secretory action of the skin.

A reference to the analyses already given will show that the Kissingen, to take this as an example of the chalybeate group, contains carbonate of iron, and a large proportion of saline ingredients. This combination is specially useful in that the iron is present in an easily assimilable form, the salines correcting any tendency to constipation, which is so frequently met with in conditions which call for its administration.

The chief conditions which derive benefit from Harrogate treatment, as may be in part inferred from what has been said, are the following :—

Convalescence from Acute Illness.—In these cases, the bracing and invigorating climate improving the appetite, and the eliminating action of the waters, combined possibly with the Harrogate Massage, or Vichy Douche, restoring tone and mproving the general circulation, are of great service. The condition of the patient rapidly improves, as is evidenced by increase in weight, and in a few weeks there is commonly complete restoration to health, the period of convalescence being undoubtedly shortened by removal from, perhaps, an overcrowded city, with a germ-laden and enervating atmosphere, to a favourable environment.

Morbid Conditions of the Alimentary Tract.— In common with other spas, a large number of patients visit Harrogate, who are suffering from the results of injudicious or excessive eating and drinking, causing a greater or less degree of portal congestion, with its concomitant conditions. Good results are obtained from a course of sulphur water internally, many patients returning year after year. In alcoholic cases, I have been much impressed with the rapidity in which the symptoms of gastric catarrh disappear when treated in this way, the neuro-muscular tone being improved at the same time by a course of massage douches. Under this treatment, the desire for alcohol is temporarily diminished. Constipation, particularly when due to an atonic or dilated condition of the large intestines, is

frequently very responsive to a course of waters combined with abdominal massage. The relief of portal congestion through their agency makes them of service in hæmorrhoidal conditions. The Plombière treatment for muco-membranous colitis, an account of which, by Bottentuit, appeared in the *British Medical Journal*,[2] is now carried out at the Royal Baths.

I believe that the mild alkaline sulphur waters, such as the Starbeck, are specially indicated in the treatment of catarrhal jaundice. Reference has already been made to the efficacy of the strong sulphur waters in particular, as cholagogues. They find a place in the treatment of many functional and early organic diseases of the liver, including chronic hepatitis of malarial origin. In these cases counter-irritation, by means of he liver pack (mustard and bran), is a useful adjuvant.

Skin Diseases.—The treatment of skin diseases in Harrogate consists, in the majority of cases, in the exhibition of sulphur water, both internally and externally. The chief difference in the various sulphur waters, which are used for bathing purposes, lies in the amount of the chlorides which they contain. In using baths of sulphur water, with different degrees of saline concentration, we have at our disposal, apart altogether from the question of the temperature at which the bath is administered, the power of regulating the strength of the bath, and consequently, to a certain extent, the amount of reaction obtained. Thus, a sulphur bath of Beckwith or Harlow Car water has a sedative action on the skin; whereas a bath of strong sulphur water, the latter being much higher in the scale of saline concentration, is stimulating and irritative. The value of this will be readily perceived in considering the treatment of eczema. In an acute case, with, *e.g.*, profuse serous exudation and a high degree of inflammatory activity, a bland sedative water, such as the Harlow Car, is indicated. On the other hand, in chronic eczemas, which have entered into a sluggish and more or less quiescent stage, it is well to excite inflammatory activity by bathing in a water with the stimulating properties of a strong sulphur bath.

It would appear that, on many occasions, the beneficial effect of ordinary methods of treatment by means of external applications, *e.g.*, ointments, lotions, &c., is enhanced when associated with sulphur baths. Gouty and seborrhœic eczemas in particular derive marked benefit from a course of treatment.

Psoriasis is another condition for which a large number of patients visit Harrogate. In dealing with an eruption, in which the prognosis is so notoriously uncertain, it is difficult to express a definite opinion as to the curative value of sulphur baths as compared with other methods of treatment.

Chronic urticaria and acne rosacea, which are both so frequently the outward expression of hepatic and gastric derangement, respond very favourably to sulphur waters and baths. They are also very useful in the treatment of pruritus and prurigo. In the sulphur waters, administered internally, we have a remedy, by which the bowels can be regulated, and any hepatic disturbance, which is so frequently present in this condition, corrected. The drinking of alkaline sulphur waters is combined with the use of sulphur immersion baths, which are often very efficacious in giving not only immediate and temporary, but permanent, relief from itching.

Gout and Goutiness.—Large numbers of patients, who are suffering from chronic gout, visit Harrogate once or twice yearly. The treatment used in these cases is both internal and external. Sulphur and magnesia waters are administered, at stated times throughout the day, with the view of flushing away from the system the toxines of intestinal origin, which are supposed to be responsible for the metabolism with production of uric acid, present in the condition. Baths, massage, douches, &c., are of marked service in the treatment of gouty deposits and gouty inflammation involving joints and tendons. I am not, in the present paper, concerned with the question of the pathogenesis of gout, the views of which are still so conflicting, but it may be taken as a clinical fact that a course of treatment in Harrogate is followed by marked benefit, which, in many cases, is permanent. Possibly the good results are in part due to the action of the sulphur waters on the liver.

Reference has already been made to their value in the treatment of gouty eczema, and I have observed on several occasions marked improvement in gouty iritis, pain being lessened and circumcorneal injection diminished.

Chronic Rheumatism and Rheumatoid Arthritis. — By chronic rheumatism, I refer to that class of case to which Stockman[2] has recently drawn attention, in which the fibrous tissues are primarily involved. A course of treatment in

Harrogate for such cases is found of very great benefit, and particularly when it is undertaken early, and the fibrous thickenings are in a plastic condition. It is remarkable how quickly, with skilled massage, swelling, pain, and stiffness disappear, and mobility is restored. In the treatment of cases in which fibrous induration is present in the neighbourhood of a joint, *e.g.*, the knee, I have found the Bertholet bath a valuable remedy. The knee is placed in a cylinder for 20 to 30 minutes through which steam is passed, and is afterwards massaged for 4 or 5 minutes, the preliminary steaming rendering the tissues around the joint much more supple for manipulation. In mono-articular gonorrhœal arthritis, even when sub-acute, I have made use of the Bertholet bath (without massage if it causes pain), and I am satisfied that the duration of the inflammatory process has, on many occasions, been shortened by these means. In the treatment of inveterate cases of gonorrhœal polyarthritis, during the time in which the baths are being administered, there is oftentimes a considerable relief of symptoms, but, unfortunately, of a temporary nature only.

The application of the D'Arsonval high-frequency current, by means of electric massage, appears to be a form of treatment which is well worth a trial in cases of lumbago of long standing. When occurring in gouty subjects, a course of waters, together with baths to induce free diaphoresis, and local massage, is beneficial.

Patients suffering from rheumatoid arthritis may derive much benefit from a course of waters and baths at Harrogate. In poorly nourished subjects, the pure air and bracing character of the climate tend to improve the general nutrition, and local treatment, such as I have described, does undoubtedly sometimes arrest the progress of the disease. It is common to prescribe a course of chalybeate waters for the anæmia which is so often present in the condition. In some cases of rheumatoid arthritis, the peat bath, which acts as a poultice to the whole body, is useful in relieving pain and stiffness ; and in advanced cases, it is surprising how much benefit can be derived from the use of warm baths and massage in reducing swelling and promoting the absorption of effusion.

Except in cases of sciatica in gouty subjects, I attach chief importance to external treatment rather than to the administration of waters internally, and have found the

PLATE XLIX.

[*Photocrom Co*

Royal Baths: Pump Room.

PLATE L.

[Photocrom Co.

Harrogate Combination Bath (Needle, Shower, Wave, Douche, &c.).

Greville hot air bath on occasion very useful. The value of balneo therapeutic treatment, in some types of neurasthenia, is too well known to render any comment from me necessary. All cases of constitutional syphilis which require mercurial inunction are relegated to the Starbeck Baths, and it may be noted that the absorption of mercury into the system is very rapid when rubbed in immediately after a sulphur bath, probably owing to the stimulating effect of the latter upon the skin. The iron waters are much used for patients suffering from chlorosis, particularly the Kissingen water, as it not only contains iron in an easily assimilable form, but the presence of the salines renders it an efficient aperient when administered in adequate doses. Some of the conditions which require a flushing out of the urinary tract (*e.g.*, renal or vesical calculus, gravel) derive considerable advantage from the administration of one or other of the waters which are diuretic in action. I may also mention that the Nauheim treatment by baths and exercises, is efficiently carried out at the Royal Baths. Space will not permit me to describe any of the methods, which are adopted in the treatment of obesity, but it will be readily seen, from what has already been said, that, in many of the baths, we have means which tend to promote tissue change and increase metabolism.

Contra-indications.—In considering the contra-indications to a course of treatment at Harrogate, some reference must be made at the outset to the question of the time of the year when the conditions are most favourable. The largest number of patients come in August and September, the usual duration of stay being from two to four weeks ; but as the climatic conditions are equally favourable from the beginning of May until the end of October, there is advantage in taking a course either before or after these two busy months, when the bathing accommodation is not so severely taxed. The bathing establishments are open throughout the year, but in the winter months Harrogate is cold and strong westerly winds prevail, conditions which are unfavourable to many invalids.

It is obviously unwise to send to Harrogate, patients who are suffering from any grave organic or acute disease. The atmospheric conditions are not ideal for patients, suffering from pulmonary tuberculosis, owing to the prevalence of winds which are cold in winter, and apt to be accompanied by a certain

amount of dust in the summer. Cases of eczema on exposed parts should not come for treatment in the cold months of the year. Speaking generally, for all individuals who do not bear cold well, Harrogate is contra-indicated in the winter months. In this category, I would draw particular attention to debilitated patients suffering from malnutrition, from whatever cause, rheumatoid arthritis, and chronic rheumatism.

Railway Communications.—The most direct route to Harrogate from London is by the Great Northern Railway viâ Church Fenton. The journey is about 4 hours in duration, and in the summer months in particular the service is excellent. The Great Northern Railway also books passengers from London (King's Cross) viâ York, with through carriages to Harrogate. There is yet another route by the Great Northern system, passengers changing at Holbeck Junction (Leeds).

The Midland Railway also provides a good service of trains between London (St. Pancras) and Harrogate, viâ Leeds. For passengers from Edinburgh and the north of Scotland, the Great Northern Railway runs several express corridor Edinburgh and London trains viâ Harrogate, so that with them no change is necessary. Through trains run from Glasgow and the west of England to Leeds, which is situated 20 miles south of Harrogate, there being a frequent service of trains between the two towns.

The London and North Western Railway provides good through accommodation to Harrogate for Irish (viâ Holyhead) and Lancashire passengers, the latter being further provided for by the Lancashire and Yorkshire Railway. The Midland Railway has recently opened a new route to Belfast and the North of Ireland viâ Haysham, from which port there is a good express service to and from Leeds.

These railway facilities form a marked contrast to the long, tedious, and expensive journey, which is involved by a visit to a Continental Spa. I have endeavoured in this article to show that Harrogate occupies a foremost place among health resorts when considered in the light of its natural mineral water resources, climatic advantages, and bath equipment.

REFERENCES.

[1] *Journal of Anatomy and Physiology,* Vol. XXXIII.
[2] *British Medical Journal,* June 27, 1903.
[3] *British Medical Journal,* February 27, 1904.

BY-PATHS OF MEDICINE.

THE EVOLUTION OF THE APOTHECARY.

THE term "apothecary," as denoting a general practitioner of medicine, has almost fallen out of use. Yet men of middle age can remember when the phrase "using the 'potecary" was employed by stately dames whose grand-daughters would now speak of "calling in the doctor." In the recently published *Memoirs of Henry Greville* a story is told of an elderly nobleman who, feeling ill when out driving, called on his "apothecary" on his way home. Referring to Dr. Polidori's challenge to his patron, Byron, a *Quarterly* reviewer disdainfully declared it to be impossible that a peer should fight his apothecary. The gibe here is directed at the physician's profession, "apothecary" being evidently regarded as applicable to any practitioner of the healing art. A general practitioner of the present day would justly resent being called an "apothecary." Originally, the apothecary was nothing more than a compounder and vendor of medicines, and it was not till the eighteenth century was well advanced that he came to be generally recognised as *de facto* qualified to prescribe them. In his *Essay on Criticism*, published in 1711, we find Pope writing :

> "So modern 'Pothecaries taught the art
> By Doctors' bills to play the Doctors' part,
> Bold in the practice of mistaken rules
> Prescribe, apply and call their masters fools."

It may not perhaps be superfluous to point out that by "Doctors' *bills*" Pope means prescriptions.

The evolution of the apothecary has been a long struggle against the jealousy of rivals. Their earliest enemies were the grocers, from whom they were separated only by *force majeure;* later they had to contend on the one hand with the physicians and, on the other, with the surgeons. The hostility of the professional corporations has survived to our own day. Less than twenty years ago, when the Medical Acts were in course of amendment, a determined effort was made by the Colleges of Physicians and Surgeons to suppress the Apothecaries' Society,

which they plainly looked upon as an inconvenient competitor
for the fees of candidates in search of a registerable qualification.

The story of the Society is told by Mr. C. R. B. Barrett in a
handsome volume, illustrated by the author's own hand, which
has lately appeared.[1] The narrative is mainly founded on the
records in the minute book of the Society, which have been
preserved in an absolutely perfect state. Our critical conscience
compels us to say that the greater part of the book is a chronicle
of very small beer. The author seems to have but an indifferent
sense of historical perspective, nearly as much space being
assigned to petty quarrels among the members, and to the
delinquencies of beadles and butlers, as to important events
in the life of the Corporation. The explanation may perhaps
be that the author's mind became subdued to that it worked in,
for it is easy to gather that the contents of the minute book
are of so unappetising a nature, that even Dryasdust would
have found them hard to digest. Even when matters of
general interest lay directly in their way, the Court did not
suffer their attention to wander from the business of the shop.
The Great Plague of London passed over their heads almost
unnoticed, and the Great Fire, in which their own hall was
burnt, received only casual notice. Mr. Barrett has done his
work conscientiously, and it is not altogether his fault that
the book is somewhat heavy reading. To the student of the
history of the City Companies, however, it has the permanent
value, that must always attach to a careful first-hand study of
authentic documents.

The Worshipful Society of Apothecaries of London owes
its original charter to James I. The British Solomon had,
in 1606, united them with the Grocers, but in 1617 he put
asunder what he had joined together, and made the Apothe-
caries into a separate company, under the designation of the
Master, Wardens, and Society of the Art and Mystery of the
Apothecaries of the City of London. It is clear that they were
not granted the right to prescribe medicines and treat diseases.
This appears from the following passages in the charter :—

" Forasmuch as it is signified unto us, on behalf of our well-
beloved subjects, the Apothecaries of our City of London, and

[1] *The History of the Society of Apothecaries of London.* London : Elliot Stock.
1905.

also affirmed and approved unto us, by our well beloved *Theodore de Mayerne* and *Henry Atkins,* Doctors of Physic, our discreet and faithfull Physicians that in these latter years, very many Empiricks and unskilful and ignorant Men, and unexperienced, do inhabit and abide in our City of *London* and the Suburbs of the same, which are not well instructed in the Art or Mystery of Apothecaries, but are therein unskilful and rude, do make and compound many unwholesome, hurtful, deceitful, corrupt and dangerous Medicines, and the same do sell unto many parts of this our kingdom of England, and the same do daily transmit to the abuse and scandal not only of them which embrace the knowledge of Physic and of the learned Physicians of this our realm of *England* professing the same, and of the Apothecaries of our City of London, being educated and expert in the same Art or Mystery, but also to the great peril and daily hazard of the Lives of our Subjects."

Further on it is declared unlawful for any person or persons whatsoever not belonging to the Society of the Art and Mystery of Apothecaries " to furnish, have, hold or keep an Apothecary's shop, or to make, mix, compound, prepare, give, apply or administer any Medicines, or any way to sell, set on sale, put forth or put to sale to any person or persons whatsoever any compound Medicines or medicinable Compositions, (viz.) Distilled Waters, Compounds or Olea Chimica, Apozemata, Sirrups, Concerves, Eclegmata, Electuaria, Condita, Medicinalia, Pillules, Pulveres, Troches, Olea Unguenta, Emplastra, or by any other way whatsoever to use or exercise the Art, Faculty or Mystery of an Apothecary &c."

The Grocers tried hard to get the decree of divorce between them and the apothecaries pronounced null and void, and many of the apothecaries seem to have been not very eager for freedom. The King stood firm, however, and the Charter was maintained. For some years, the young society had a sore struggle with poverty, and it was not till 1632 that it had a house of its own. About that time, the apothecaries came into collision with the physicians, who wished to keep the compounders and dispensers of physic in their place. The apothecaries themselves showed a like spirit towards the distillers, whose charter they opposed on the ground of alleged " manifold and dangerous abuses." What these abuses were

may perhaps be gathered from a document, wherein it is asserted that the material ingredients of their distillations of strong waters were principally the emptyings of brewers' vessels, droppings of alewives' taps and washings of beer hogsheads, which "they call a low wine"; to these were added spices, seeds, and herbs, and finally the delectable compound was "dulcified" with "the refuse or dross of sugar fit only for hogs' treacle."

Under date January 16th, 1653, there is an entry to the effect that "Chirurgeons that sett to sale medicines that are only to be sold by apothecaries are to be prosecuted henceforward." Meanwhile the quarrel with the physicians waxed fiercer. It is clear that already the apothecaries had overstepped their prerogative. In 1664 a conference of representatives of the two bodies was held, at which the apothecaries insisted "that the College considers no Drs., fellowes, Licentiates, Penrniss, or Honorari fellowes that keep Apothecaries in their shoppes." On their side the physicians proposed that apothecaries should not practise; and that they should give assurance faithfully to prepare prescriptions. The Plague interfered with the settlement of the dispute, and in 1675 the smouldering quarrel burst forth into flame. The College of Physicians determined to establish a dispensary, where "all such poor who shall bring certificates with them from either any of the Aldermen, Deputies, Common Council men, Churchwardens or Overseers for the Poor that they are fitt objects of charity," should receive free advice "in their several maladys and distempers." The physicians, being anxious that the apothecaries should participate in the merit of their charity, invited them to supply the medicines to the poor at a low rate. The apothecaries offered to supply them "at their intrinsic value." They made the further offer that, "if summoned by the Churchwardens or Overseers in the absence of the Physicians to give assistance," they would do so for nothing, "as they are capable." This was construed by the jealous physicians as a step in the direction of independent practice. Finally, the pinch of dust required to end this great battle was supplied by Garth in his mock-heroic epic *The Dispensary*. The real question at issue was whether the apothecaries should be allowed to prescribe medicines. The material victory remained with

them, for they began definitely to assume the status of general practitioners.

In the early days of the nineteenth century came the first stirring of the waters of medical reform, and by the Act of 1815 the Society was formally recognised as *de jure* a medical licensing body. Thenceforward for many years the "College and Hall" supplied the recognised qualifications of the general practitioner. The apothecaries took an active part in the great struggle for further reform that began about 1840, and ended in the passage of the Medical Act of 1859, which established the Medical Register, and created the General Medical Council to be its keeper.

The apothecary has now become ashamed of his title, which he is endeavouring to get altered into something that shall more accurately express his true function. This is not a new movement. Even before the middle of the last century, in a memorandum addressed by the Court of Examiners of the Court of Assistants, it was pointed out that "one of the chief evils in the present position of the apothecary is his name, which has little reference to his actual duties," as he is in fact "the medical attendant on the larger mass of the community, and should be designated the General Practitioner of Medicine." Nothing, however, was done to remove the grievance.

Reviews of Books.

The Development and Anatomy of the Prostate Gland, together with an Account of its Injuries and Diseases and their Surgical Treatment. By W. G. RICHARDSON, M.B., B.S., F.R.C.S., Assistant Surgeon at the Royal Infirmary, Newcastle-on-Tyne. London : J. and A. Churchill. Pp. 121. 47 illustrations. Price 10s. 6d.

To quote from Mr. Richardson's preface, " This is only an essay, and makes no pretension to be a treatise on the subject of the prostate."

An excellent and careful account is given of the anatomy, comparative anatomy, and development of the prostate ; a short discussion of the causes, symptoms, and pathology of enlargement of the organ, of the complications of this condition and their treatment, and of supra-pubic and perineal prostatectomy. This is followed by a note on acute prostatitis, abscess, calculi, tubercular disease and malignant disease of the prostate, and a list of cases of prostatectomy from various sources is appended.

The sections on the anatomy and development contain a record of careful dissection and observation. In many of the anatomical points, the author's description coincides with those recently published, as, for instance, in regard to the position of the prostatic plexus. Many of his observations are of extreme interest. The pelvic fascia is looked upon as a series of fascial coverings for the muscles with thickenings here and there where the different fascias meet. The layers covering the prostate, bladder, and rectum are the proper fascial coverings of the viscera, which have firm or loose connections where they come in contact with the rectovesical fascia.

The superior layer of the triangular ligaments cannot be demonstrated as a well-defined fascia, but is " really an anatomical expression for the blending of a number of fascias entering into it."

In discussing the cause of enlarged prostate, the author says, " There is only one factor common to all cases of enlarged

prostate, and that is *age*. This appears to me to be sufficient cause in itself for the condition known as chronic enlargement of the prostate," and later, " It is, I believe, a normal process, and can only be accounted pathological when it offers some mechanical obstruction to micturition."

The author apparently supports these rather startling views by a discussion on natural selection, which does not seem to us to have much bearing on the question.

Supra-pubic prostatectomy is more fully described than perineal, but in both the account is curtailed. The description of the remaining diseases is incomplete and unsatisfactory. The only mention of injuries is on page 106, where it is stated that acute abscess of the prostate " occasionally follows injury by a lithotrite or catheter, and it may follow the operation of prostatectomy." The latter must surely demonstrate a very incomplete removal.

The illustrations are beautifully drawn and reproduced, and form a valuable series of plates illustrating the anatomy and comparative anatomy of the prostate.

Had Mr. Richardson confined the present publication to the development and anatomy of the prostate, nothing but praise could have been bestowed upon his work. As the book stands, however, it is badly balanced and does not cover the ground indicated in the title.

A Textbook of Pathology for Practitioners and Students. By JOSEPH MCFARLAND, M.D., Professor of Pathology and Bacteriology in the Medico-Chirurgical College, Philadelphia, &c., with 350 Illustrations. Philadelphia, New York and London : W. B. Saunders & Co. Price 21s. net.

IN view of Professor McFarland's great reputation as a Pathologist, we turned to the volume before us with considerable interest. In the Preface we are told that it has been the author's aim to avoid over-voluminousness, and to write a manual for students preparing for the M.D. degree. We must own that we are somewhat disappointed at the results achieved. The book certainly contains a very large amount of information, but in order to compress it into the space of a volume it has been necessary to resort to the very questionable expedient, in a text-book, of using two founts of type. We do not think

this compromise, as the writer calls it, is advisable in a book of the kind. Either the subject-matter is necessary and therefore should be read, or it is unnecessary and should be omitted. If the former, it deserves large type; if the latter, it does not merit even small print. And this power of selecting the proper things to omit is just the faculty which characterises a teacher, and which we had hoped to find characterised the author of this textbook. As an example of the defects produced, we may point out that the parasitology of malaria is so important, as an illustration of the life-history of an animal parasite, that it should be especially studied by students; whereas here it is relegated to small type, which can only encourage the inexperienced reader to skip it. Again, the various kinds ot monstrosities are of little practical importance, since most of the severe developmental defects are incompatible with post-natal life; yet they are here detailed at considerable length and illustrated with an abundance of figures, striking, indeed, but unnecessary, and of the nature of "window-dressing." Figures throughout the book are borrowed to a much greater extent than we should have expected in a work by a writer of Professor McFarland's experience. We note with surprise that the writer states definitely that Pernicious Anæmia is a disease of hæmogenesis, and that he makes no allusion to the more usually held view that it consists essentially in an excessive destruction of blood-corpuscles. We must commend the enterprise of the publisher in bringing out so large and well-got-up a volume at so moderate a price.

A Textbook of Clinical Diagnosis by Laboratory Methods, for the Use of Students, Practitioners, and Laboratory Workers. By L. NAPOLEON BOSTON, A.M., M.D., Associate in Medicine and Director of the Clinical Laboratories, Medico-Chirurgical College, Philadelphia; formerly Bacteriologist at the Philadelphia Hospital and at the Ager Clinical Laboratory of the Pennsylvania Hospital. Pp. 526. 231 figures, 34 plates. Philadelphia, New York, and London: W. B. Saunders & Co. Price 18s. net.

IN the preface the author expresses the hope that this volume will prove of practical value to the Student and Practitioner, but after carefully considering the book, we have come to the

conclusion that it is more particularly an excellent guide for those working in a clinical pathological laboratory. Chapter I. consists of a detailed account of the examination of the blood, including the study of fresh blood in various morbid conditions, the bacteriology of blood and the parasitic diseases affecting the blood. There is a paragraph on the cryoscopy of blood, including its clinical significance. Thirteen plates represent the microscopic appearances of stained blood-films, which are without exception excellent. Chapter II. deals with the chemistry and microscopic study of the urine, and contains some very good figures and plates representing the various crystals which occur in urine. The albumosuria, described first by Henry Bence-Jones, is considered at length. Chapters III. and IV. include accounts of the examination of the gastric contents of vomit and of the fæces, and conclude with a description of the intestinal worms. In the concluding chapters the sputum, the buccal and nasal secretions are dealt with, and there is a brief account of the bacteriology of the various discharges from the conjunctival sac. The lumbar puncture is described, as well as the organisms which may be found in the cerebrospinal fluid in disease. Finally, there is a short account of the organisms found in diseases of the skin, and the last chapter deals somewhat briefly with milk. The whole volume is excellently got up, and should be a useful reference book to the practitioner, to whom we can confidently recommend it.

The Channels of Infection in Tuberculosis, together with the Conditions, original or acquired, which render the different Tissues vulnerable, being the Weber-Parkes Prize Essay, 1903. By HUGH WALSHAM, M.A., M.D. Cantab., F.R.C.P., Physician to Out-Patients, formerly Pathologist to the City of London Hospital for Diseases of the Chest, Chief Assistant in the Electrical Department of St. Bartholomew's Hospital. Pp. 150. Plates 16. London : John Bale, Sons, and Danielsson. Ltd. 12s. 6d. net.

THIS interesting and valuable essay, which gained for Dr. Hugh Walsham the Weber-Parkes prize in 1903, consists of two parts ; the first deals with the Channels of Infection in Tuberculosis, and the second with the conditions, original or acquired, which render the tissues vulnerable to the tubercle

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bacillus. The essay itself was illustrated by some 280 micro-
scopical preparations, some of which have been reproduced in
the present volume. During the time that Dr. Walsham was
pathologist to the City of London Hospital for Diseases of the
Chest, he performed two hundred post-mortem examinations
upon persons who died of tuberculosis, chiefly of the pulmonary
type, and it is upon the observations made in the performance
of this work that the chief facts set forth in the essay are
drawn. It is important to note that Dr. Walsham believes that
so-called scrofulous glands are really tuberculous, that Schrön's
capsules are involution forms of tubercle bacilli, and that the
tubercle bacillus can be passed through a normal intact mucous
membrane without leaving any trace behind it. The channels of
infection are divided into five, viz., the hereditary transmission,
the lymphatic vessels, the blood vessels, epithelial channels,
and inoculation into the skin or tissues. It is shown that the
old theory that tubercle bacilli are inhaled, passed through the
lung, and so reach the bronchial glands, is improbable, but that
the bronchial glands receive the infection through the normal
intact epithelium of the trachea, bronchi, or œsophagus. Dr.
Walsham concludes that the tissues, instead of being almost
immune from tuberculous disease, are very frequently affected,
and he looks upon the disease in the kidneys as an excretion
tuberculosis. He also points out that the two main conditions,
which render the tissues especially vulnerable to the tubercle
bacillus, are want of fresh air and sunlight and insufficient food.
The relation of alcoholism and other diseases to tuberculosis is
discussed. There is an interesting appendix, one portion of
which refers to Schrön's capsules, and the other illustrates the
attitude of the more advanced school of German physicians
towards Inhalation Tuberculosis. The author is to be congra-
tulated upon the excellence of the work. The plates are
beautifully reproduced. We heartily recommend the work to
all interested in the subject of Tuberculosis, for the book must
be read to be appreciated.

Ophthalmological Anatomy, with some illustrative Cases. By
　　J. Herbert Fisher, M.B., B.S., F.R.C.S. London :
　　Hodder and Stoughton.

It is with a sense of relief that we find a really new book on
ophthalmology, and one that is quite out of the usual run of

text-books on refraction and diseases of the eye, with which our bookshelves are stocked. The volume under consideration is divided into two parts ; the first describes the anatomy of everything connected with the eye, except that of the eyeball itself, and the second gives clinical cases illustrating various anatomical facts. Part I. is divided into nine chapters, including one on some points in development ; while Part II. describes twenty-three cases. There are many diagrams in the text, all of which illustrate well the points under consideration. They might, however, with advantage have been rather more numerous. The volume is well written and well got up, and we heartily congratulate Mr. Fisher on the production of a work that cannot fail to be of great use to the ophthalmic world ; moreover, it is a book that displays care in its production, and reflects credit upon its author.

The Refraction and Motility of the Eye. For Students and Practitioners. By WILLIAM NORWOOD SUTER, M.D. Washington. Illustrated with 101 engravings and 4 coloured and monochrome plates. London : Sidney Appleton. 9s. net.

THIS useful book is divided into four parts, each containing several chapters. Part 1 enters into the theory of refraction. Part 2 describes the refraction and motility of the normal eye. Part 3 the errors of refraction. Part 4 the disorders of motility. The book is well written and well got up, and although it deals with a subject, which is surrounded with the possibilities of mathematical demonstrations, yet the descriptions are by no means unnecessarily complicated by these. The illustrations are excellent, and add much to the value of the book. It may be thoroughly recommended as a guide to the study of refraction, and is sure to be popular among those for whom it has been specially written.

Notes by the Way.

The Plague. IN all probability before this number of THE PRACTITIONER sees the light the outbreak of plague at Leith will be a thing of the past. Nevertheless, the incident suggests some uncomfortable reflections. As long as cases come as single spies, the vigilance of the sanitary sentinels who keep watch and ward over our ports may be trusted to deal effectually with them. But if they should come in battalions it is quite possible that the plague might gain a footing in the country. Under the immensely improved conditions of life that now prevail, it is unlikely that it could be the devastating scourge it was in the seventeenth century. But there is still overcrowding and starvation and dirt enough in our large towns to afford a plentiful supply of material for a serious epidemic. And there is the terrible example of India before our eyes to show how difficult it is to get rid of the disease when once it is established. We used to be assured by those who had opportunities of observing the course of plague that it had a normal cycle of seven years or thereabouts, and when this cycle was complete it tended to die out spontaneously. This generalisation has been conspicuously falsified in India, and now that plague is extending its ravages to tribes which supply some of the finest soldiers to our Indian Army it was high time that the attention of the Home Government should be drawn to what may easily prove a source of serious danger to our Empire. The indifference with which it has hitherto been treated by the public can be explained only by ignorance. As the peoples of India have no votes, Parliament troubles itself not at all about them; if any vexatious questions are asked, a Commission is sent out and nothing more is heard of the matter.

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A Futile Commission. THE commission of bacteriologists sent out some years ago, presented a report the tendency of which was to hint a doubt and suggest dislike of the work of other bacteriologists. Now

another commission of bacteriologists has gone out, and it may without rashness be predicted that the result will be the same. The truth is that pure bacteriologists, though useful in their proper sphere, are utterly out of place as advisers in practical emergencies. They are the narrowest of all experts and deal with living men and women as if they were test tubes. Not long ago a system of antityphoid inoculation notoriously imperfect in details, and believed by some whose judgment justly carries great weight to be by no means free from risk, was solemnly blest by a commission of bacteriologists because they thought the British soldier a good subject for scientific experiment. The fact must be faced that Haffkine's preventive inoculations and Yersin's curative serum have so far proved equally futile. Whatever power for good they have is so small as to be scarcely worth taking into account ; and in any case the natives will have none of them. The problem must be solved by rational hygiene directed by statecraft, and helped if need be by bacteriology—but strictly as a handmaiden, not as the mistress.

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The L.C.C. and Pauper Lunatics. THE Bill by which it is proposed to give the London County Council power to establish " receiving houses " for the treatment of persons suffering from mental disorder in an early stage so that, if possible, they may be snatched from the jaws of the asylum, is so obviously inspired by practical wisdom as well as by an enlightened sentiment of humanity, that it might have been expected to meet with universal approval from the medical profession. It is significant that the loudest, if not the only, note of opposition comes from the conference of Metropolitan Poor Law Medical Officers. That body has formulated a series of more or less ingenious objections to the proposal ; no mention, however, is made of one which may perhaps have been regarded as unimportant. If the early care of persons of unsound mind were transferred from the Board of Guardians to the London County Council, a considerable number of fees for certification would be diverted from the pockets of the Poor Law Medical Officers. This might well claim the tear of sensibility, but it could scarcely be described as a hardship to the patients, and it probably

would not grievously afflict the guardians. In any case the first consideration must be the public benefit, and there can be no doubt that the mental wards now attached to the London workhouses are not the best shelters for persons wandering on the way along which madness lies. If the "receiving house" is to be what it should be, that is, a psychopathic hospital where mental disease is studied and treated with all the resources of modern science applied by a medical staff of the same quality as those who serve the general hospitals, there is every reason to anticipate that a very large proportion of persons who would otherwise drift into hopeless insanity would be cured without suffering the ineffaceable brand of the asylum, and that additions would be made to knowledge which would lead not only to great improvement in the treatment of mental disorders, but to the discovery of means of prevention. From the workhouse infirmary this cannot be looked for; Boards of Guardians have never displayed any marked zeal in the furtherance of scientific progress.

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Finger-prints and the Detection of Criminals. THE finger-print test of identity may not be as infallible as its out-and-out advocates maintain, but it is sure enough for practical purposes, provided it is rightly used and the impressions are correctly interpreted. This, however, is not always an easy task, and not seldom it requires a special knowledge and an analytical skill that can be acquired only by a few, and by them only after a long course of training. As a recent trial has shown, the theory of Scotland Yard seems to be that of the eternal prototype of the policeman in regard; to reading and writing. Our modern Dogberry acts as if he believed that the interpretation of finger-prints comes by nature. Deeming the assistance of a properly trained expert unnecessary, he deals with obscure finger-prints as trenchantly as a higher critic disposes of inconvenient texts in the Bible. The matter is an extremely serious one for the public, for it is the instinct and also the interest of the police to secure a conviction, and an innocent man might easily be condemned on the misreading of finger-prints by a member of the force with a soul above trifling differences of curve and arrangement. If we are to be hanged

by the markings of our finger tips, at any rate let us have the melancholy satisfaction of knowing that the decipherment has been made *secundum artem*, and that we are not the victims of the blunderings of Policeman X.

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The Registration of Nurses. THE plain man must wonder why so much fuss is being made about the registration of nurses. To our mind the expediency of such registration is not arguable ; the case for registration stands on exactly the same footing as that for the registration of medical practitioners. The only question is : Are nurses to be registered by the State or by some body established by private enterprise ? There is the further question : If it is to be done by the State, *quomodo*, and especially *quibus auxiliis*, is it to be done ? The present situation is puzzling and just a little grotesque. There are before Parliament two Bills, and the supporters of each of which, who are of course animated by the purest philanthropy, have so far successfully blocked each other. While they are trying in this way to show the nurses that Codlin's the friend, not Short, a third set of philanthropists take the opportunity of asking the Board of Trade to give them the privilege of stamping a trade mark on the nurses. This business-like move naturally arouses the generous indignation of the other bodies, which of course have no commercial interest in nurses ; and the Central Hospital Council, the British Medical Association, the Royal College of Surgeons in Ireland, the British Gynæcological Society, the Royal British Nurses' Association and the Council of Matrons (not to be confounded with the more familiar Jury of the like style and title) magnanimously combine against the Incorporated Society for the Promotion of the Higher Education and Training of Nurses. Such harmony is in immortal souls ! This rivalry in the work of raising the nurses to a higher professional life is very beautiful. But surely the nurses must be somewhat overwhelmed by the number of their patrons ! It is just possible too that they may think that some of them protest too much. When they are assured by Sir Victor Horsley that the Representative Meeting of the British Medical Association, over which he so efficiently presides, has expressed approval of the principle of registration

they may be shrewd enough to understand that the acceptance of the principle is a mere Platonic sentiment involving no agreement as to details. They may further have some inkling of the fact that the resolution, such as it is, cannot be taken as expressing the general feeling of members of the Association. Dr. Langley Browne, speaking as a representative of the Association, said, "The medical profession objected to the proposal." Possibly it does, but we do not know how Dr. Browne knows this unless it be by what theologians call "infused knowledge." We venture to say that the medical profession would not be disposed to accept either the Representative Meeting, or the Association itself as the authorised mouthpiece of its opinions. It may be hinted that the nurses might not unreasonably be a little suspicious of the blandishments of the British Medical Association. As conducted by its present wire-pullers, that body is a trade union naked and unashamed, and as such it represents the least noble elements in our noble profession. It is therefore extremely doubtful whether even the influence of Sir Victor Horsley will be powerful enough to induce it to play any but an obstructive part in the movement for the registration of nurses.

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Ankylostomiasis. WITH reference to a paragraph under this heading which appeared in THE PRACTITIONER for April (p. 582), we have received a letter from Professor Elliot Smith of the School of Medicine, Cairo, pointing out that he was there wrongly credited with the discovery of the fact that infection may take place by penetration through the skin, which belongs to his colleague, Professor Looss. He says that not only has Professor Looss "absolutely demonstrated this important fact, but also by means of a series of experiments has followed the larvæ step by step in their wanderings through the body from the site of the skin infection to the intestine." Professor Looss had intended to demonstrate the facts at the meeting of the British Medical Association at Oxford, but being unable to visit England last summer he asked Dr. Elliot Smith to exhibit his specimens and give an account of his work. Dr. Elliot Smith goes on to say, " As for several years the credit of the brilliant and laborious

nvestigations carried out by Dr. Looss in Cairo had been so often and so unjustly attributed to other writers, I took special pains to make it quite clear both in the title and in the text of my communications that I was acting, in the unfortunate absence of Dr. Looss, merely as a reporter of his work, and that neither I nor anyone else had any share in his investigations." It should be added, he points out, that a similar erroneous statement appeared in THE PRACTITIONER for September 1904, p. 431. We frankly express regret for having inadvertently fallen into error, and we apologise both to Professor Elliot Smith and to Professor Looss for the annoyance thus caused them.

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A Problem of Latinity. IN a trial which excited a good deal of interest about a year ago, the Lord Chief Justice, as an *obiter dictum*, laid it down that "all doctors' Latin is bad Latin." He went on to ask a medical witness if he really suggested that doctors' Latin is classical, to which the witness, a Scotchman, cautiously replied "some of it." There are, of course, doctors who can write and speak Latin that would not have sounded *pingue* or *peregrinum* to the ears of Tully; if an example is desired, we may point to Dr. Guido Baccelli, Professor of Medicine in the University of Rome, and some time Italian Minister of Public Instruction. But "doctors' Latin" is not at all the same thing as the Latin of doctors who happen to be scholars. The Latin of prescriptions, which is "doctors' Latin" in the technical sense, is not, and cannot be, classical, for it has to express things unknown to the ancients. Notwithstanding this, it might be grammatically correct ; but the fact is that comparatively few practitioners could write out an ordinary prescription in full without one or more blunders which reveal abysmal ignorance—or let us salve our professional pride by saying, disregard—of the most elementary rules of Latin accidence and syntax. We have seen *per orem* in one of our leading medical journals, and *coxum varum* in the other. In comparison with such montrosities what is a slight confusion between the genitive and the accusative ? These remarks are prompted by a remonstrance addressed to us by a friendly

critic as to the use of the genitive in the last line of prescriptions, *e.g.,* infus*i* calumb*œ* ad ℥i. We agree with our critic that the accusative would be more correct, but we think the genitive can be defended by assuming that "quantum sufficit" is understood. In Latin that blessed word "subauditur," like the hypothesis of a First Cause according to the French geometrician, *explique bien des choses.* As a practical solution of the difficulty we suggest a dainty device which has the sanction of no less an authority than Cicero. When Pompey was about to consecrate a temple to Victory, and the fact that he was then Consul for the third time had to be indicated, a great debate arose among the learned whether the word should be *tertio* or *tertium.* Cicero settled the question by directing that it should be *tert.* in the inscription. Let the practitioner therefore write " *Aq.* ad, &c.," and he may defy pedantry.

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Competitions.   THE result of the April competitions is as follows :—The best essay was sent in by Mr. William Sheen, Cardiff.   The best answers to the three questions were written by Dr. Edward Harrison, of Hull. Cheques have accordingly been sent to these gentlemen.

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Practical Notes.

ANGINA PECTORIS.—Angina pectoris, or, as it is sometimes called, *breast-pang*, is fortunately a somewhat rare disease. In its true form the chief symptoms are sudden paroxysms of agonising pain over the cardiac region and extending into the arms and up the neck, as a rule accompanied by a sensation of impending death. In treating cases of angina pectoris, it must always be borne in mind that the condition is not a disease *per se*, but is symptomatic of a number of morbid conditions, such as insufficiency of the aortic valves, an adherent pericardium, arterio-sclerosis, especially involving the two coronary arteries, and consequently producing degenerative changes in the myocardium. On post-mortem examination, there is occasionally found evidence of chronic aortitis at the root of the aorta, which is associated with some aneurysmal dilatation of that vessel. At the same time the chronic inflammation at the root of the aorta must interfere with the circulation of blood through the coronary arteries. Various types of angina pectoris are described. (1.) There is *true angina*, with the grave symptoms as mentioned above, and associated with local morbid conditions of the heart or the aorta itself; the acute agonising pain in this condition is due, no doubt, to the involvement of the nerves forming the superficial and deep cardiac plexuses, which lie in relationship with the arch of the aorta. (2.) There is *pseudo angina*, which may be conveniently divided into two types, namely, the *neurotic* and the *toxic*.

The neurotic group occurs more frequently in women, and is usually associated with functional and neurasthenic trouble or vasomotor disturbances, such as sudden coldness and numbness in the fingers and toes, pain in the cardiac region, and faintness. The toxic group of cases is brought about by heavy smoking of strong tobacco, or by drinking strong tea or coffee. The treatment of pseudo angina must depend upon the cause of the condition, for when the cause is removed, little else is

required. True angina must be treated on very different lines. The patients, who suffer from the affection, should endeavour to live quiet lives, as far as possible free from all worry and excitement, and should never perform any sudden muscular exertion. Care must be taken never to overload the stomach, and dyspeptic conditions must be properly treated. The carbohydrates of the food must be diminished. During the attack the patient, who, as a rule, lies down quietly, should inhale slowly 3 to 5 minims of amyl nitrite from a crushed glass capsule, which is encased in cotton-wool and silk. The inhalation should be continued for about five minutes. Should the patient resist the action of the amyl nitrite, which is antispasmodic and vasodilator, chloroform should be inhaled at once. Should the pains continue, 1 to 3 minims of liquor morphinæ acetatis may be injected, or the same dose of the injectio morphinæ hypodermica may be used.

Between the attacks nitro-glycerine, whose action is much like that of the nitrite of amyl, only slower and more persistent, should be taken, although the effects of a dose usually pass off in two hours. Liquor trinitrini is usually administered in one-minim doses in a little brandy three times daily, or, more conveniently, one chocolate tablet of nitroglycerine may be taken three times a day. Sodium nitrite, in 1 or 2 grain doses, is also recommended. In some cases of angina pectoris, associated with general arterio-sclerosis, especially if connected with gout, large doses of the iodides sometimes produce beneficial changes. These should be given in 10 to 15 grain doses three times daily. These are said to cause vasodilatation of the blood vessels generally, including the coronary arteries, and consequently to finally lower the blood pressure. An occasional purge, such as pilula hydrargyri gr. iv., should be administered to those who have a high arterial tension. It is important to remember that patients, suffering from angina pectoris, may die suddenly without, so far as we can tell, experiencing any pain.

"SPOTTED FEVER."—Cerebro-spinal meningitis is frequently called "spotted fever" or petechial fever. This is a misnomer, for hæmorrhages are more frequently absent than present.

Sporadic cases occur from time to time in large towns, but epidemics occur during the winter and early spring months. In the *malignant form* the onset is sudden, with headache, shivering fits, drowsiness, with stiffness in the extremities. The head is retracted; the temperature is slightly raised above normal, there may be hyperpyrexia, the pulse is small and may be slow, and petechial spots develop. Death usually occurs in a few days.

In the *ordinary form* the patient usually complains of headache, anorexia, and pains in the back. Then suddenly the headaches become more severe, and the temperature rises to 102, when vomiting usually occurs. The head becomes early retracted, and the pains in the back increase. There may be photophobia, with or without optic neuritis, and an increased sensitiveness to noise. As a rule hyperæsthesia is general. Squints and ptosis may occur spontaneously. There may be insomnia with nocturnal delirium, even mania. Later drowsiness and coma supervene. Petechial spots occasionally occur, and herpes labialis is frequent. The abdomen is normal, and the patient is constipated. Kernig's phenomenon is nearly always present. It may be demonstrated as follows :—Get the patient to sit up, or to nearly sit up, in bed, then try to extend the leg on the thigh, a marked contraction of the hamstring tendons is felt in the popliteal space with inability to straighten the leg. The course of the disease varies very considerably. *Anomalous forms* are described, but the more usual are the abortive and intermittent types.

The disease may readily be mistaken for enteric and typhus fever and for other varieties of meningitis. In doubtful cases the blood should be examined, when it will be found that there is a polynuclear leucocytosis, which will help to differentiate the condition from enteric fever. The lumbar puncture introduced by Quincke should also be performed, and some cerebro-spinal fluid withdrawn. Dr. Hermann Leuhartz, of Hamburg, recommends that an average of 30 c.c. should be withdrawn (*Münchener Medizin. Wochenschrift*, 21, iii. 1905). During the performance of the puncture it is usually found that the pressure within the subarachnoid space is increased. The fluid is usually turbid, and contains many polynuclear leucocytes, and a few lymphocytes. The former contain the *diplococcus*

intracellularis meningitidis, described by Weichselbaum. This may be cultivated in characteristic colonies.

The chief indications in treatment are to feed the patient on milk, adding brandy if necessary ; the bowels should be kept free. The spasms are best treated by hypodermic injections of morphia in 3-minim doses, but they may also be controlled by a combination of bromides and chloral hydrate as follows :—

℞. Potassii Bromidi - - - gr. xx.
Chloral Hydratis - - - gr. xij.
Syrupi Aurantii - - - ♏ xxx.
Aq. Chloro. - - - - ad ℥ i.
Misce. Ft. Mist.

Two tablespoonfuls to be taken three times daily.

The following medicine may also be found of use in persistent cases of cerebro-spinal meningitis :—

℞. Potassii Bromidi - - - gr. xii.
Potassii Iodidi - - - gr. x.
Syrupi Aurantii - - - ℥ ss.
Aq. Dist. - - - - ad ℥ i.
Misce. Ft. Mist.

Two tablespoonfuls to be taken three times daily after food.

Some physicians recommend the administration of potassium iodide in small or moderate doses as soon as the diagnosis of cerebro-spinal meningitis is made. This should be continued three times a day.

THE PHYSIOLOGY OF THE DIGESTIVE PROCESS. GAS-TRIC DIGESTION.—The alkaline saliva which is swallowed with the food causes a flow of gastric juice. This contains the pepsin-hydrochloric acid which acts upon the proteid food, converting it first into acid-albumin or syntonin, then into primary (proto- and hetero-albumose) and secondary albumoses (deutero-albumoses), and finally into diffusible peptones. Gelatin is converted into bodies called gelatin-peptones. Some of the succroses, as cane sugar, are hydrolised by the free hydrochloric acid into glucoses such as dextrose and levulose. Maltose is hydrolised into dextrose. The proteid envelope of the fat molecule is digested, and so the fat is set free. There

is no direct action upon fat itself, which is the chief reason why pork is so indigestible, the muscle fibres being protected from the action of the gastric juice by the fat particles around them. More recently, it has been suggested that the acid gastric juice does cause some chemical change to take place in fat itself. Peristaltic movements, which take place in the stomach, aid gastric digestion, by bringing the particles of food into contact with the gastric juice, and it is well-known that, if these movements are deficient, dyspepsia soon follows. The gastric juice, in virtue of the free hydrochloric acid which it contains, acts as an antiseptic, and is then capable of killing micro-organisms which are swallowed with the food. Should the amount of hydrochloric acid be deficient, then pathological bacteria are more likely to gain access to the small intestine, where they multiply in the alkaline contents. Some of the cells, lining the stomach glands, secrete a ferment called rennin, and this causes the caseinogen, the most abundant proteid of milk, to be converted into insoluble casein. The first action of the rennin is to convert the soluble caseinogen into soluble casein, which combines with the soluble calcium salts present to form insoluble casein, or, as it is sometimes called, caseate of calcium. This is precipitated in a gelatinous form. It has been shown, by experiments upon dogs, that the composition of gastric juice varies somewhat with the kind of food taken. The larger the amount of proteid in the diet, the more abundant is the gastric juice, which is also richer in pepsin and hydrochloric acid. Dextrin also produces an increased flow of juice rich in pepsin-hydrochloric acid. The vagus appears to be the nerve which contains the secretory fibres for the stomach. These may be paralysed by atropine. It has recently been shown that the epithelium, lining the stomach, produces an antipepsin, which neutralises the pepsin, so that the mucous membrane of the stomach protects itself from being digested by its own juice. Gastric digestion is completed as a rule in about three hours.

COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the May Competitions will be announced in the July number.

a.—The Subject of the Essay for June is

The Treatment of Retention of Urine.

b.—Answers to the following questions are invited :—

1. What are the varieties of cysts which occur in connection with the pancreas?

2. What sequelæ are liable to follow carious teeth?

3. A married female, aged 32, came to the hospital with the following history. Previously to three months she had had good health, except three years ago when she had an attack of rheumatism, of this she said she recovered completely, She has had two healthy children, both of which are alive, and there have been no miscarriages. Three months ago she began to feel seedy and tired, with no energy for work. Suddenly one morning she awoke with a very bad headache which lasted all day ; she felt sick but did not vomit. Towards evening she was no better, so went to bed early ; she slept badly, and on waking in the morning found she could not move her right arm or right leg ; she could speak quite well. It was noticed that she could not move the right side of her face ; her vision was also impaired. She was treated by her doctor and recovered. On examination now it is found that she has right herminaropia ; her field of vision is contracted to the 40-degree circle in the left eye and to the 20-degree circle in the right eye. There is no Wernicke's pupillary inaction. The patient can read quite well. There is no paralysis now. The right knee-jerk is a little more brisk than the left ; there is no marked extensor response in the right big toe. The heart and lung sounds are normal, and the patient feels quite well. The urine is normal.

What lesion would account for these symptoms?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner " Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of July, 1905. No Essay must contain more than two thousand words, and the Editor reserves the right to publish any Essay which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner " Questions," and must be sent to the Editor on or before the 1st day of July, 1905.

A and B.—(1) One side of the paper only must be written on.

    (2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

    (3) The decision of the Editor is final.

    (4) Competitors must be registered General Practitioners.

    (5) The attached Coupon must be filled up by each competitor.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

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